

RAILROAD GAZETTE

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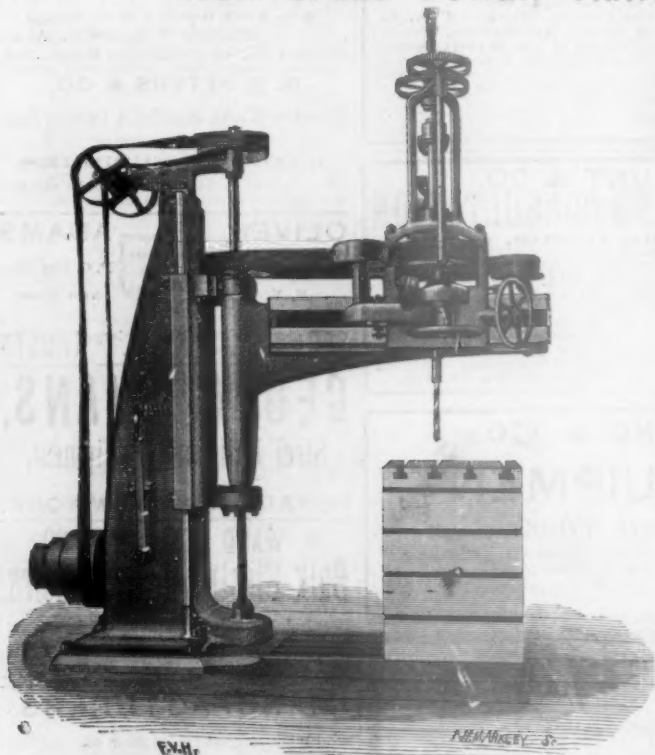
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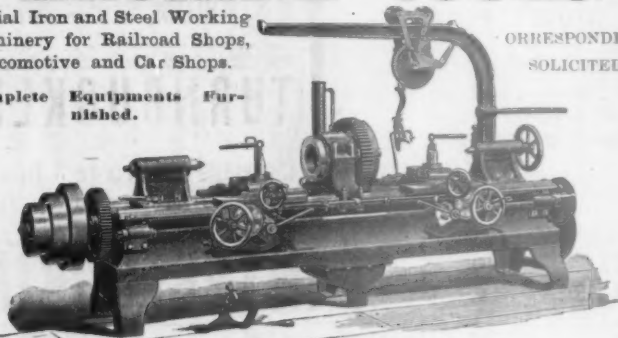
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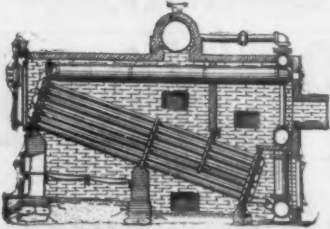
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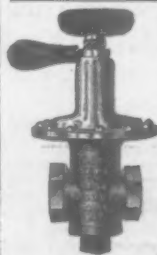
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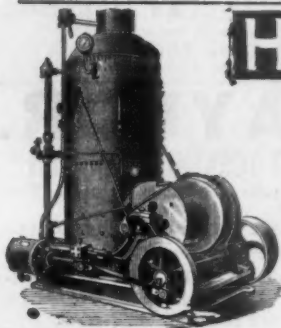
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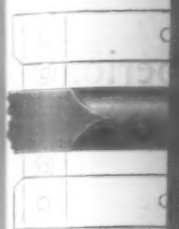


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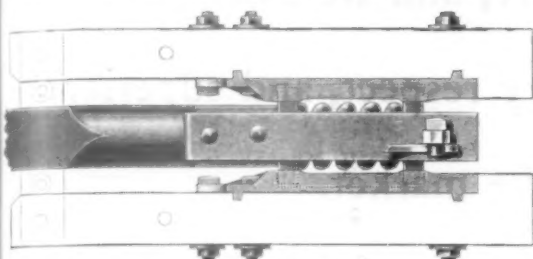
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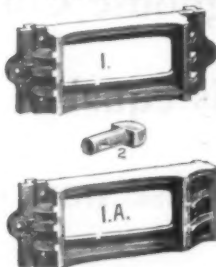
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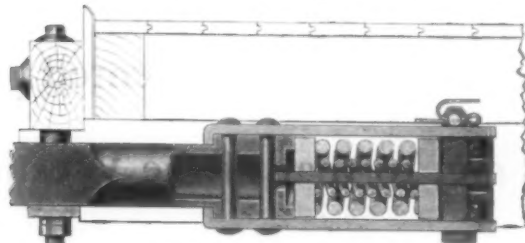
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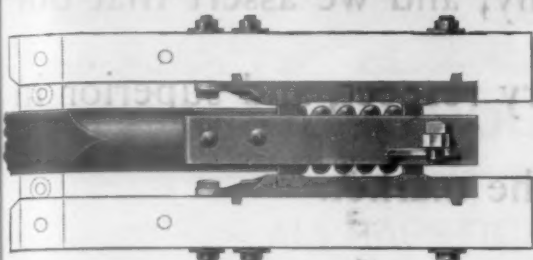
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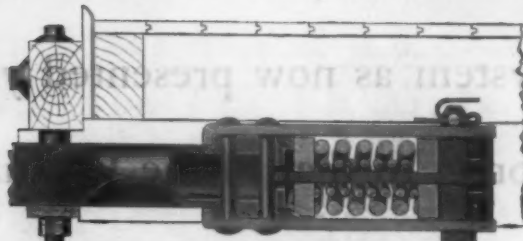
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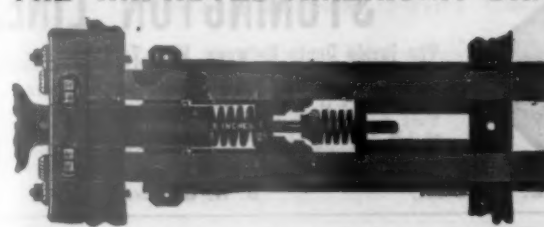
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Bloomington Car Co.	31	Crook Loco. & Mach. Co.	27	Hawley Steel Car Works	12	Middleton, W. & Co.	18	Porter & Co.	31	Wason Mfg. Co.	31
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Bush, Dredging Machine Co.	31	Crook Loco. & Mach. Co.	27	Hawley Steel Car Works	12	Middleton, W. & Co.	18	Porter & Co.	31		
Bush, Dredging Machine Co.	31	Crook Loco. & Mach. Co.	27	Hawley Steel Car Works	12	Middleton, W. & Co.	18	Porter & Co.	31		
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Cresco Lumber & Con. Co., Ferdinand, Fla.
Lehigh Valley Cro. Wks. P. Ambler, N.J.
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Gorman Pneumatic Gate Co., Chic., Ill.
Culvert Pipe
Blackmer & Post, St. Louis, Mo.
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Schoen Mfg. Co., Pittsburgh, Pa.
Drawbar Attachments
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American Steel Wheel Co., N.Y. City.
Butler Drawbar Attach. Co., Cleveland.
Hinson Drawbar Attach. Co., Chicago.
Dredging Machinery
Bucyrus (O.) Steam Shovel & Dredge Co.
San Francisco Bridge Co., California.
Vulcan Iron Works, Chicago.
Vulcan Iron Works, Toledo.
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Billings & Spencer Co., Hartford, Conn.
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Engineer. Employment Bureau, 8 Granger Bldg., Syracuse, N.Y.
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National Agency, Phila., Pa.
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Heller & Brightly, Philadelphia, Pa.
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Kouff & Esser, New York City.
Queen & Co., Philadelphia, Pa.
Young & Sons, Philadelphia, Pa.
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Albert Lucas, 15 Broadway, N.Y.
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Field Water Purifier Co., Chicago.
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Western Fence Co., Chicago, Ill.
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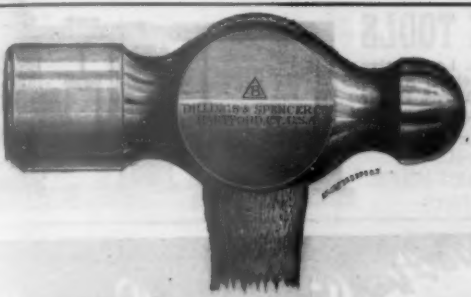
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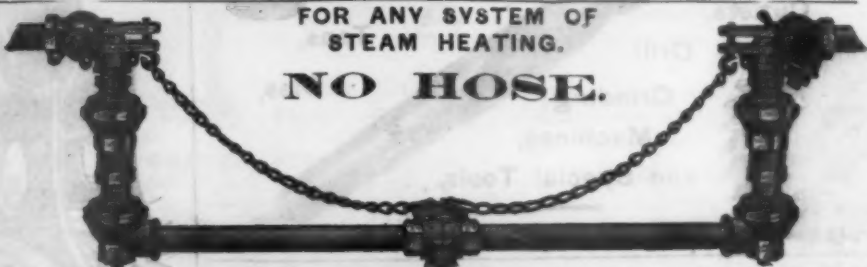
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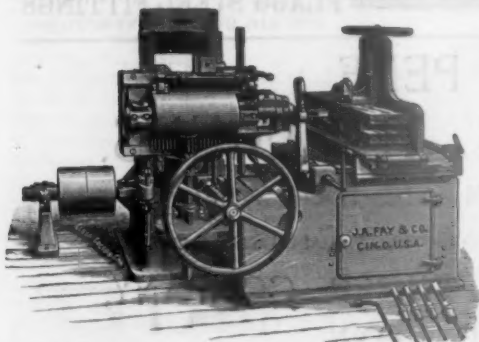
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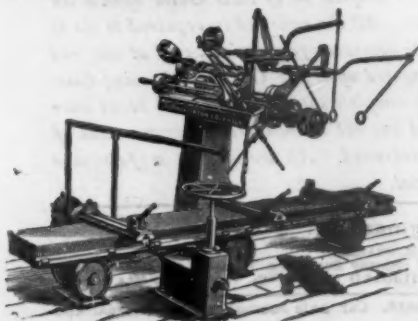
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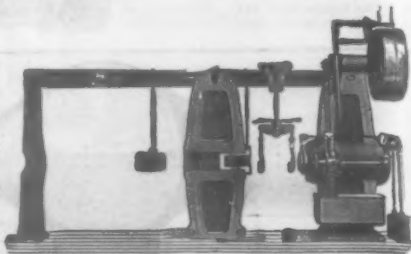
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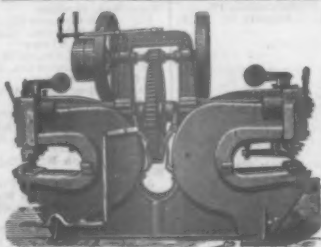
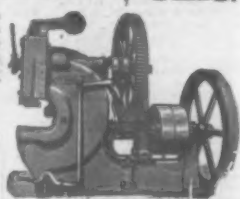
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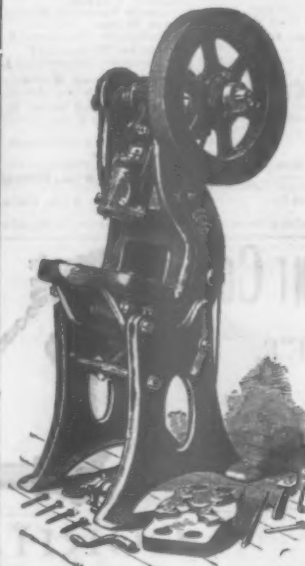
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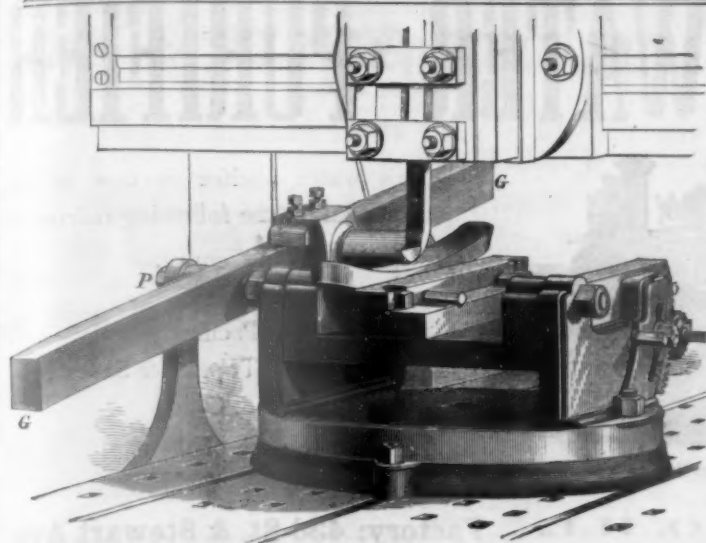
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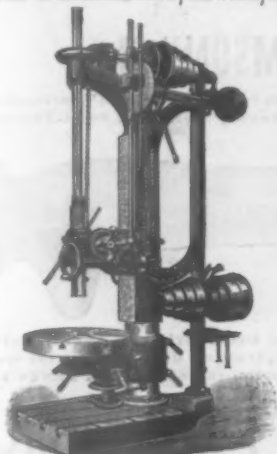
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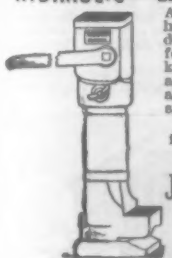
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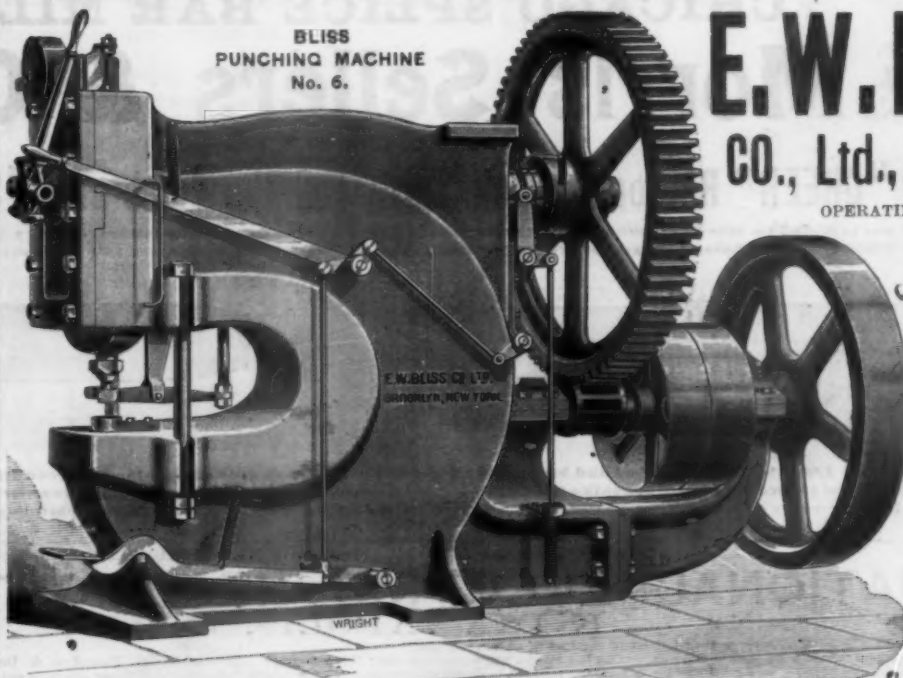
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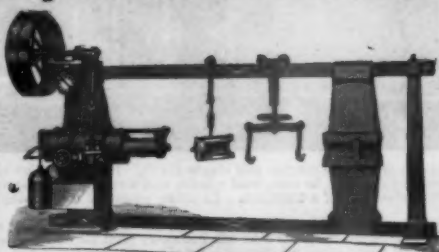
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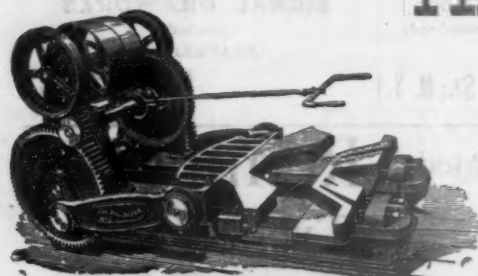
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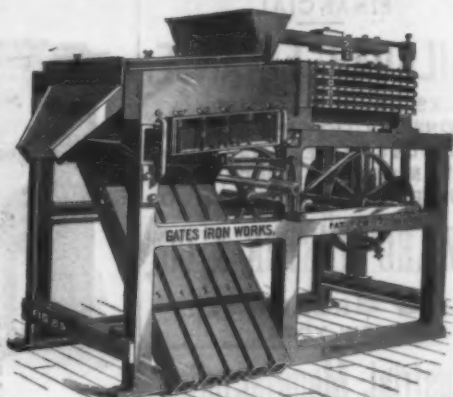
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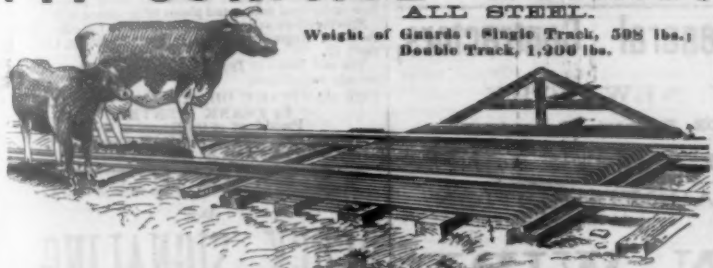
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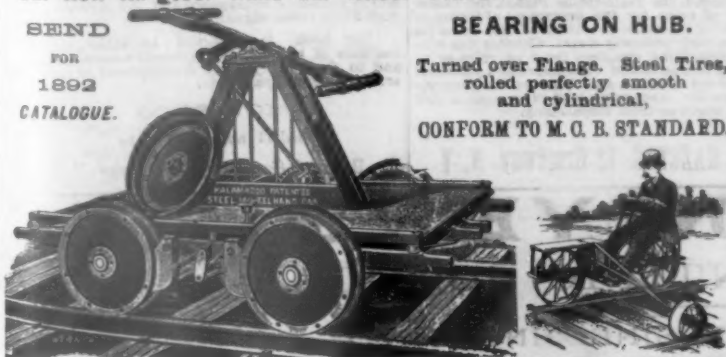
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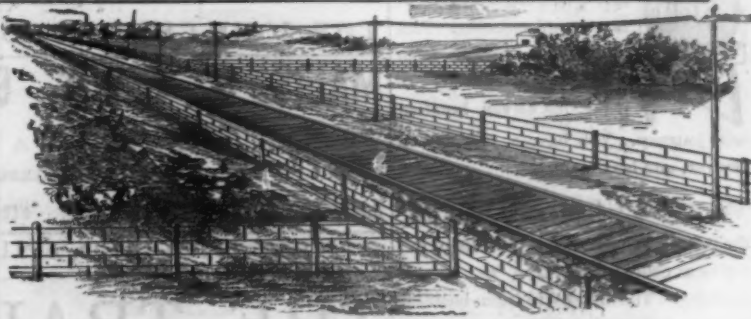
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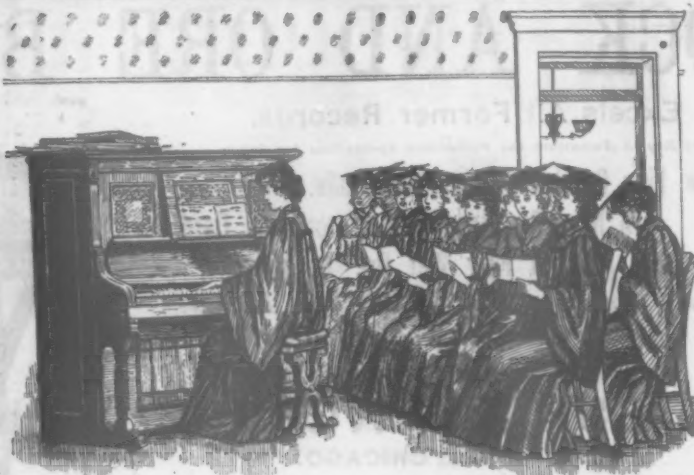
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SANITARY DISTRICT OF CHICAGO. TO CONTRACTORS.

Sealed proposals addressed to the Board of Trustees
of the Sanitary District of Chicago, and indorsed:
"Proposals for Excavating the Main Drainage Chan-
nel" will be received by the clerk of said Sanitary Dis-
trict at Room 11, Rialto Building, Chicago, Ill., until
12 m. (standard time) of Wednesday, the 15th day of
October, 1892, and will be publicly opened by the
said Board of Trustees at the regular meeting held
that day, or at a special meeting called for that pur-
pose.

The work for which the said tenders are invited is
the excavation of the main drainage channel for the
said sanitary district between Willow Springs and
Summit, Ill.

Bids will be received on two propositions, desig-
nated as "Proposition 1" and "Proposition 2," re-
spectively.

Under "Proposition 1" the said work will consist in
all of the excavation of about 11,400,000 cubic yards
of earth, and of about 500,000 cubic yards of rock, and
the building of 40,000 cubic yards of dry rubble wall,
and under "Proposition 2" it will consist in all of
about 7,825,000 cubic yards of earth, of about 350,000
cubic yards of rock, and of 40,000 cubic yards of dry
rubble wall.

Said work will be divided into six sections, each of
which will be treated as a separate contract in can-
vassing the proposals and making awards. As all
awards will be made by individual sections as pro-
vided in the specifications and forms of proposals to
be furnished bidders, each bidder must make prices
for each section, separate and distinct from every
other. The lumping of prices in any bid will render
such bid informal, and will cause its rejection by the
said Board of Trustees.

As the question of which proposition will be acted
upon will not be determined by the Board of Trustees
until after the time set for receiving proposals, the
bidder is allowed to make two alternative tenders,
based upon the terms of the specifications for each of
the two propositions respectively.

Each proposal must be accompanied by a certified
check, or cash to an amount equal to \$3,000 multi-
plied by the number of sections bid upon; provided
that the said check or cash shall entitle the bidder to
make tender under one or both of the said proposi-
tions.

All certified checks must be drawn on some respon-
sible bank doing business in the city of Chicago, and
be made payable to the order of the Clerk of the San-
itary District of Chicago. Said amount of \$3,000 for
each section will be held by the Sanitary District until
all of said proposals have been canvassed and contracts
awarded and signed, the return of said check or cash
being conditioned upon any bidder to whom an
award of any portion of said work may be made ap-
pearing within ten days after notice of such award
being given, with bondsmen, and executing a contract
with the Sanitary District for the section or sections
of said work so awarded, and giving a bond satisfac-
tory to the said Board of Trustees for the fulfillment
of the same in the amount of \$75,000 for each sec-
tion of work awarded him.

All proposals must be made upon blank forms fur-
nished by the Sanitary District, and must give the
price for each separate item of work.

The bids will be compared on the basis of the en-
gineer's approximate estimate of quantities, which will
be furnished with copies of the specifications.

No proposal will be considered unless the party
making it shall furnish evidence satisfactory to the
Board of Trustees of his ability to do the work, and
that he has the necessary pecuniary resources to ful-
fill the conditions of the contract, provided such con-
tract shall be awarded him.

Bidders are required to state in their proposals
their individual names and places of residence in full.

Specifications and plans may be seen at the office of
the Chief Engineer, Room D, Rialto Building, Chi-
cago, Ill.

The said Board of Trustees reserves the right to re-
ject any and all bids.

THE SANITARY DISTRICT OF CHICAGO.

By FRANK WENTER,

President of its Board of Trustees.

Attest: THOMAS F. JUDGE, Clerk.

Chicago, Ill., Aug. 20, 1892.

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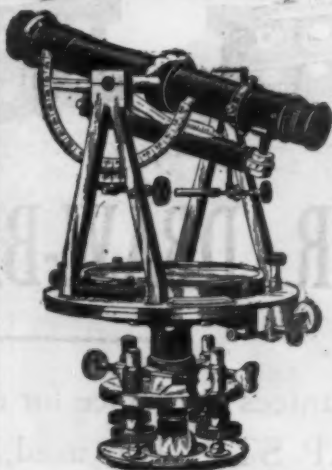
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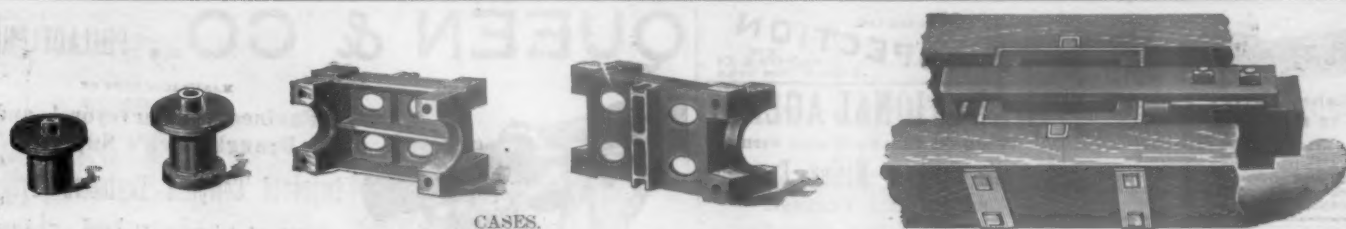
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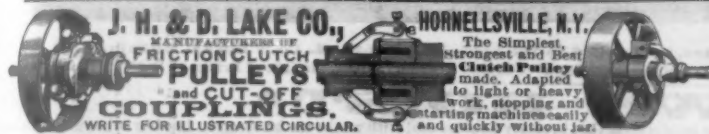
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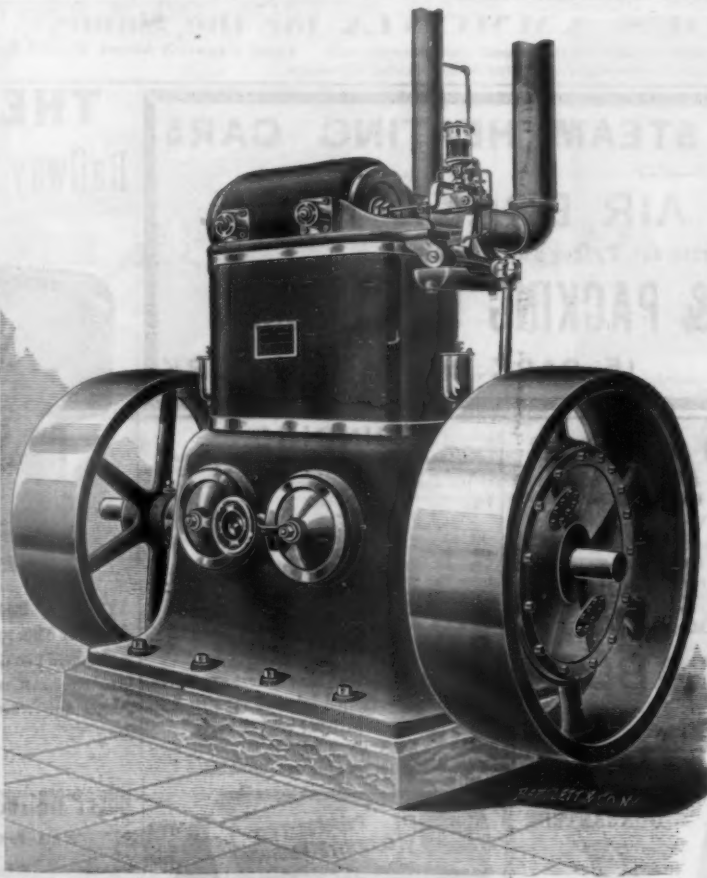
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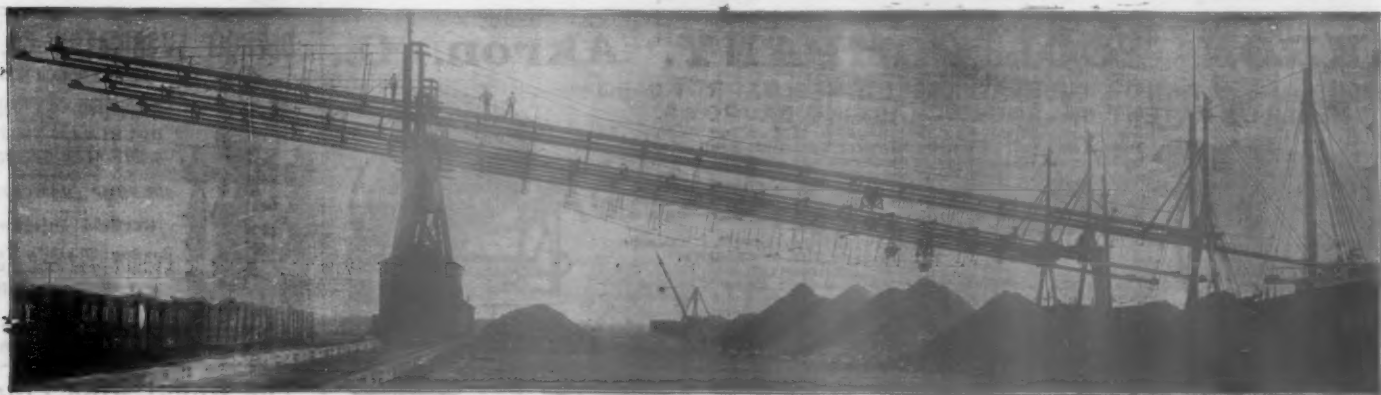
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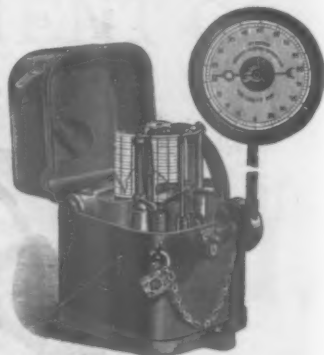
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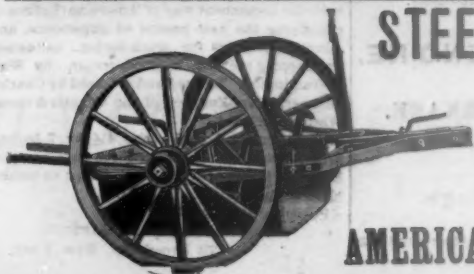
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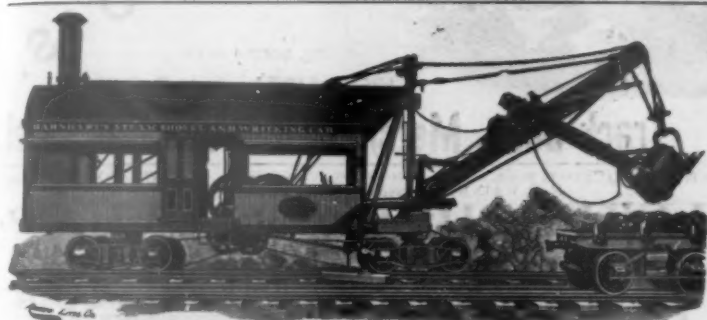
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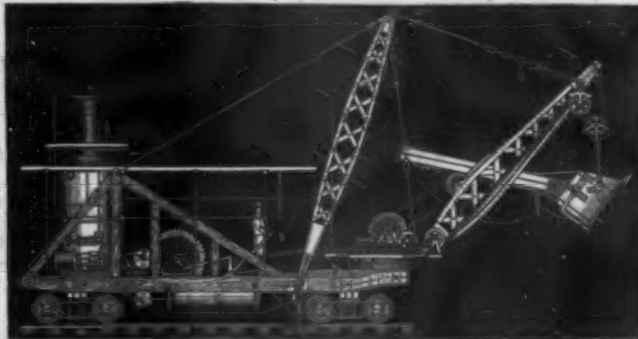
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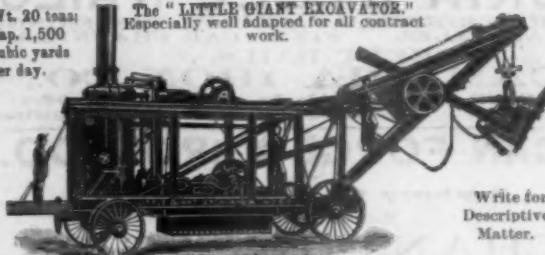
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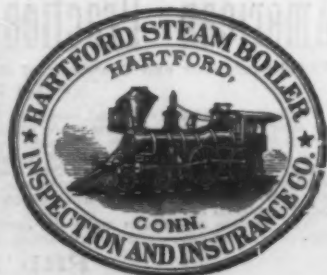
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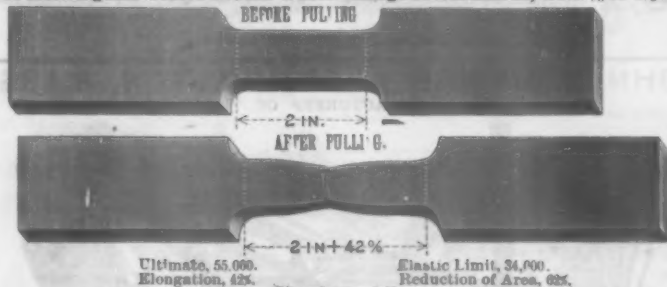
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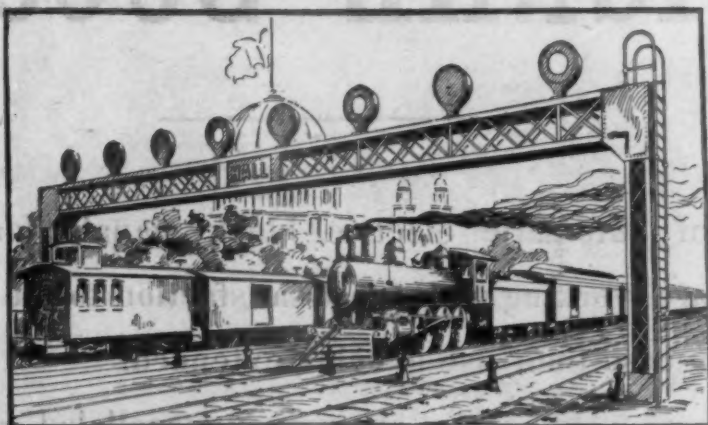
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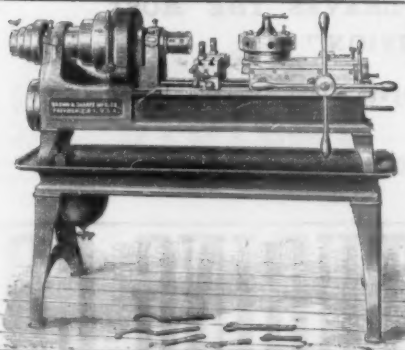
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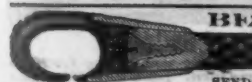


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The simplicity of this starting device, with the equal-

TABLE 1.—FUEL SAVED BY USING COMPOUND LOCOMOTIVES—ROYAL SAXON STATE RAILROADS.

	Express locomotives.		Passenger locomotives.		Goods engines.		Tank engines.	
	Number.	Saving.	Number.	Saving.	Number.	Saving.	Number.	Saving.
		Percent.		Percent.		Percent.		Percent.
Royal Saxon State railroads	8	20.9	3	18.5	16	15
(Summer half year.....)	8	11.1	3	18.0	16	19	18
(Winter half year.....)								
(Number of years of observation.)	4		2		5			

Royal Bavarian State railways, 12 express and two goods engines, 15-20 per cent.
Chicago, Burlington & Quincy Railroad (see *Railroad Gazette* of Feb. 5, 1892), 20 per cent.

TABLE 2. MAINTENANCE EXPENSES OF GOODS LOCOMOTIVES, ROYAL SAXON STATE RAILROADS.

Description of engines.	Dates when built.	Number of engines under observation.	Maintenance expenses.				Remarks.
			1st year.	2d year.	3d year.	4th year.	
Non-compound.....	1885-1887	9	\$38.75	190.25	208.50	491.00	The external inspection and the tests of the boilers take place in the fourth year.
Compound.....	1885-1888	16	\$39.00	180.00	184.75	494.25	

izing apertures, peculiar to it, in the high pressure slide valve, renders it for this reason most valuable for all the various systems of compound locomotives, and especially also for four-cylinder engines (Johnstone, Vaucrain, Mallet, Meyer, etc.), and it can be employed with every system of link motion without any modification being required; while it also offers, in comparison with all other starting systems, the special advantage of giving a larger and very regular starting effort, owing to the fact that with it, when the high pressure piston

Railroad Gazette March 13, 1891), and of the Royal Saxon and Royal Bavarian State railways.

One advantage possessed by this system is that it enables full counter-pressure steam to be employed without any additional appliance being necessary with it, for braking purposes in cases of emergency or when descending long grades; while another valuable quality is the power of considerably augmenting the total tractive force of the engine when running with the reversing lever in full gear, this increase in the duty obtainable

left side above the centre line of the boiler. This arrangement gives a clear space in the front end for flue cleaning and repairs. The details of the ball joints A, C, D and E are shown in the sections A2, C2, D2, E2, fig. 4.

The Lindner starting valve F and the piping for supplying the high-pressure steam to the low-pressure cylinder can be seen by referring to figs. 3 and 4. In figs. 1 and 2 is seen the link connection between the bogies, to insure harmony of action and to limit the angle of inclination between the trucks when passing curves. This arrangement also acts as a safeguard for the double ball expansion joint A, figs. 3 and 4, as it prevents the possibility of the joint being strained or broken in derailments, when the angle of inclination between the two trucks might be excessive.

The principal dimensions of the two standard gauge locomotives shown in figs. 1 and 2, and those of similar engines having a gauge of 2 ft. 5½ in., are as follows:

Gauge.....	4 ft. 8½ in.	2 ft. 5½ in.
Diameter of H. P. cylinders, d.....	11½ in.	9½ in.
Diameter of L. P. cylinders.....	18½ in.	14½ in.
Stroke, l.....	21 in.	15 in.
Diameter of driving wheels, D.....	3 ft. 7½ in.	2 ft. 5¾ in.
Boiler pressure per sq. in., P.....	184.7 lbs.	184.7 lbs.
Internal heating surface of fire-box.....	53 sq. ft.	43 sq. ft.
Internal heating surface of boiler tubes.....	871 sq. ft.	493 sq. ft.
Internal aggregate heating surface.....	924 sq. ft.	536 sq. ft.
Grate area.....	15 sq. ft.	10 sq. ft.
Coal space.....	87 cu. ft.	25 cu. ft.
Water space.....	159 cu. ft.	65 cu. ft.
Maximum service weight.....	50.2 tons	28.3 tons
Mean service weight.....	47 tons	25 tons
Tractive force, $\frac{D^2 l (P - 14.7)}{D}$ (in ins.) 2240.....	5.11 tons	3.38 tons
Internal heating surface per ton of tractive force.....	180.9 sq. ft.	149.3 sq. ft.
Mean service weight per ton of tractive force.....	9.1 tons	7.3 tons



FIG. 1.—MEYER-LINDNER DUPLEX COMPOUND LOCOMOTIVE—ROYAL SAXON STATE RAILROAD

has to do the starting, the admission of live steam to the receiver commences before the exhaust of the high pressure cylinder into the receiver has taken place.

The economy in fuel consumption in the case of the Lindner compounds has in all cases been found to amount to 20 per cent., as compared with non-compound locomotives of similar tractive force. This statement is supported by the reports of the authorities of the railroads on which the system is employed, among which, for example, is that of the Chicago, Burlington & Quincy, given on page 104 of the *Railroad Gazette* for Feb. 5, 1892, where it is stated that the compound "has proved to be a decided success."

Table 1, which shows the comparative fuel consumption of compound and ordinary locomotives on the Saxon State railroads, affords a clear summary of the results obtained, and does not require any further explanation. It refers purely to the comparison of engines which have run in similar service and on the same road.

It is a favorite argument of the few people who still raise objections, based on mere assumptions, against the compound system as a whole, that the latter must necessitate increased expenditure for maintenance. Table 2, which is compiled from the data obtained on the Saxon State Railroads, and which is a comparison between locomotives of exactly similar type and tractive force, which had similar duties to perform on the same road, affords a safe criterion on this point also, and shows that the cost of maintenance of compound locomotives is by no means higher than that of non-compound ones. This must also be evident, if it be remembered that the Lindner compound engine has only, as additional parts, a single cock and one light pipe.

The practical results obtained with these engines are everywhere most favorable. The most extensive traffic experiences are those of the Wladikawkas railroad (see

being due to the supply of live auxiliary steam to the low-pressure cylinder when the reversing gear is in either of its extreme positions.

The Lindner locomotive can, in the event of one of its slide-valves or pistons becoming defective, be worked, without any difficulty, with one piston, just as is the case with the ordinary locomotive.

HOPE & CO.
18 St. Dunstan's Hill, London, England.

Meyer-Lindner Duplex Compound Locomotive.

The type of locomotive shown in figs. 1, 2, 3 and 4 was built for the Royal Saxon State Railroad. General views of two engines of this type, figs. 1 and 2, are reproduced from photographs. They show two duplex compound bogie tank locomotives. Each bogie has two pairs of drivers and carries the cylinders and valve machinery for the same. The low pressure cylinders are placed on one bogie and the high pressure on the other, toward the center of the engine, facing one another, so that the length of steam pipe connection between them is not great. Figs. 3 and 4 give a general outline of the method of distributing the steam from the boiler to the cylinders. By reference to these engravings it will be seen that the steam is led from the back of the dome through a pipe running outside of the boiler and to a point underneath the foot plate, from which point the pipe is led to the steam chest of the right hand high pressure cylinder, and from there to the left hand high pressure cylinder. From the front end of these two cylinders the exhaust steam is led through pipes joining at the yoke B, figs. 3 and 4, and passing through the double ball and expansion joint A. From this point the steam is led to the low pressure cylinders. The exhaust pipes from these cylinders join at the yoke C, and the exhaust steam is led thence through a single pipe having ball joints at C and E. The exhaust pipe enters the smokebox on the

"Toughened" Steel Rails.

The rail section which is shown herewith is a careful reproduction, reduced one half, of a template cut from a rail recently taken out of the track of the New York,

New Haven & Hartford Railroad after 21 years of service. It is entirely obvious from the outline of the head that very little has been lost by abrasion or by the flow of the metal. The behavior of this rail under hard service appears so excellent that we sent a specimen to Dr. Maunsel White, of the Bethlehem Iron Company, for analysis. It seems that Mr. P. H. Dudley sent another and a larger piece about the same time, and Dr. White was able to add to the value of the chemical analysis by pulling tests. All of the facts which we have appear in the following communications:

New York, New Haven & Hartford Railroad, {
Mr. VERNON, N. Y., June 3, 1892.

I send by express template specimen for analysis of 60 lb. steel rail laid in 1870 and just taken out of track in the progress of our new work. The specimens sent are Cammell "toughened steel," Sheffield, 1870, and were in use continuously on a down grade of 45 ft. per mile, leading to the old crossing where it was necessary that all trains

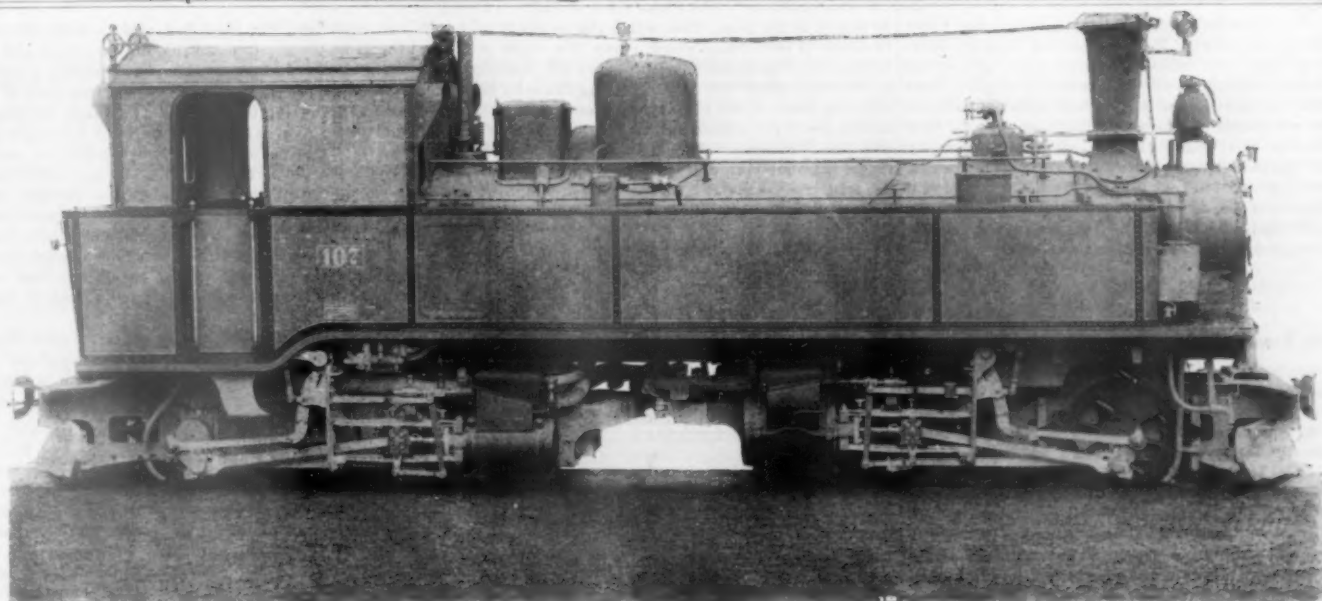


FIG. 2—MEYER-LINDNER DUPLEX COMPOUND LOCOMOTIVE—ROYAL SAXON STATE RAILROAD.

should slack up (apply brakes). The up track is laid of "John Brown" steel of same date, and will come up shortly.

HENRY B. SEAMAN, *Engineer of Construction.*

AN EXAMINATION OF THE CHEMICAL AND PHYSICAL CHARACTERISTICS OF CHARLES CAMMELL & CO.'S TOUGHENED STEEL.

The two pieces of rail, the analyses of which are here given, were taken from rails coming from the main track of the New York, New Haven & Hartford after a service of 22 years. Such length of service is surely sufficiently excellent to make an analytical examination of the metal interesting, and in a measure profitable. These pieces were furnished by Mr. P. H. Dudley, and the *Railroad Gazette*, independently of each other, requesting an analysis. That from Mr. Dudley was some 20 in. in length, representing the whole section of the rail; that from the *Railroad Gazette* a small triangular piece from the flange. The following analyses of the respective pieces were made by Mr. A. L. Colby, chemist to the Bethlehem Iron Co.:

	From Mr. Dudley.	From <i>Railroad Gazette</i> .
Carbon.....	.27	.46
Manganese.....	.322	.371
Phosphorus.....	.055	.039
Sulphur.....	.002	.046
Silicon.....	.061	.044

The only difference here worthy of consideration is that in carbon, as affecting considerably the physical properties of the material. This difference is further in-

teresting as showing the limit of control of this element in the early history of steel rail making.

The piece from Mr. Dudley was of sufficient size to permit of test bars being taken, offering an opportunity to verify the chemical analysis by a study of the physical properties of the metal, and at the same time ascertain if possible the effect of the toughening process claimed for these rails. Accordingly two bars were cut from the head of the rail, one from either side and as near the top as possible, in order that the tested metal might show as far as possible any change of condition due to its long service. To make this apparent, one of the bars was annealed—heated to a bright cherry and allowed to cool slowly in lime—by this means to restore the normal condition of the metal.

The bars were turned, for testing, to $\frac{1}{2}$ in. diameter and 2 in. stem, with holding heads $\frac{3}{4}$ in. diameter, threaded. From this it will be seen that the position of the bar in the rail brought the centre of the tested stem slightly over $\frac{1}{2}$ of an inch from the surface of worn metal, and the exterior fibres of one side of stem slightly over $\frac{1}{2}$ of an inch below this surface. The results of these tests are as follows:

	Annealed per sq. in.	Unannealed per sq. in.
Elastic limit.....	4440	3820
Tensile strength.....	7360	7100
Elongation.....	27.5	28.0
Contraction of area.....	58.78	53.78

These results rather seem to discredit the idea of toughening, since the annealed bar gives higher results in

those properties which the accepted idea of toughening is supposed to augment. They also show that the effect of the cold rolling process to which these rails had been subjected had not to any appreciable extent penetrated to the depth from which the bars were taken.

The results from the annealed bar correspond with the chemical analysis, indicating either the correctness of the analysis or the thoroughness of the annealing, and probably both.

In order to study the comparison of the relative properties of these rails with those of to-day, from a 75 lb. rail, representing the latest ideas and promising the best results, two bars were cut and treated similarly. The results obtained are as follows:

	Annealed per sq. in.	Unannealed per sq. in.
Elastic limit.....	5870	6700
Tensile strength.....	12,320	13190
Elongation.....	8.30	8.50
Contraction of area.....	13.68	11.00

The increase of hardness over the former rails is decidedly marked, showing on the unannealed an increase in elastic limit of 64 per cent., and 83½ per cent. in tensile strength. The increase in carbon to accomplish this has been fully 100 per cent. It may be interesting to state that a large number of these latter rails were subjected to a drop test of one ton falling 20 ft.; the average deflection being about $3\frac{1}{2}$ in. In many cases, the rails were reversed and struck a second blow, fractures being exceedingly rare.

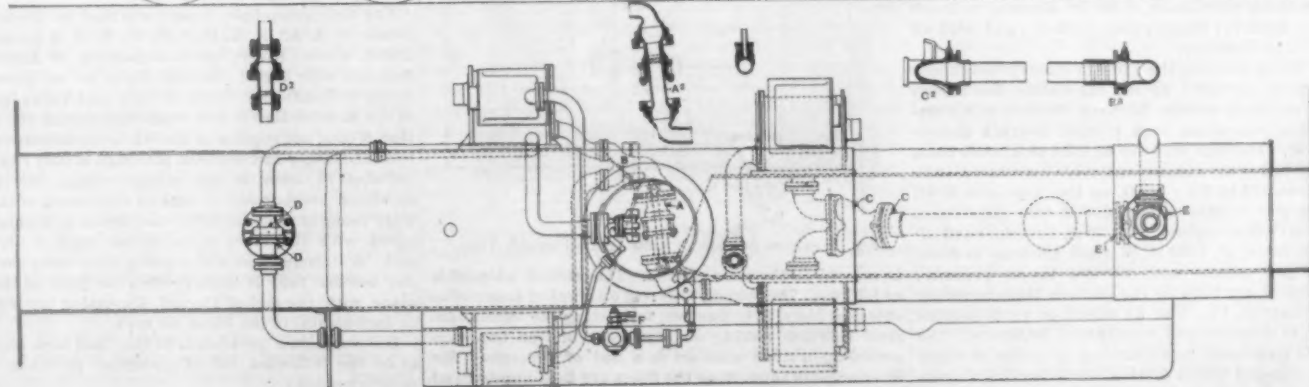
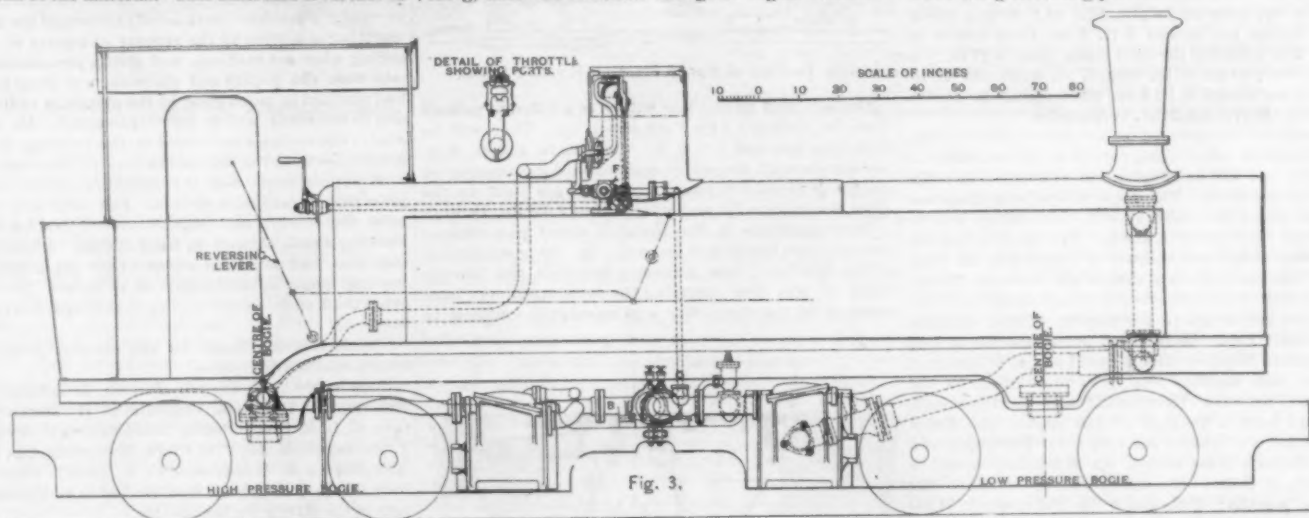


Fig. 4—Plan of Steam Connections.
MEYER-LINDNER DUPLEX COMPOUND LOCOMOTIVE.

From these few isolated facts conclusions of any value can scarcely be drawn. It is interesting to note, however, that these early rails, beginning with light wheel loads, have, through the slowly increasing weights, been brought to a condition of cold rolled surface hardness equal to withstanding the wheel loads of to-day. This point is often lost sight of, and claims of superiority made for the rails of the past over those of the present. The logical conclusion that follows from a study of the physical properties must be that the early rails would fail utterly under the heavy wheel loads that the present rail is designed, often with difficulty, to meet.

MAUNSEL WHITE.

The Broadway Cable Road, New York City.

The construction of this road, the most expensive piece of municipal engineering in this city since the building of the New York & Brooklyn Bridge, is approaching completion. The street work, track, conduits, etc., from the Battery to Fifty-ninth street is practically completed. The power station at Fiftieth street and Sixth avenue is in a forward state. Work on the Houston street and Broadway station has been delayed by the strikes in the building trades, but is expected to go forward rapidly from the present. The building of the auxiliary power station at 15 Front street has not been commenced as yet, but will be as soon as the plans are completed.

In the preliminary surveys for the conduits many interesting engineering problems presented themselves. In the tangle of water, gas and other pipe lines which underlay Broadway it was found that a 24-in. water main would have to be shifted for a long distance, and also that the entire pneumatic tube system of the Western Union Telegraph Co. from Fulton to Twenty-third streets, over two miles, would have to be rebuilt. These are but instances of the difficulties encountered, and do not include the great mass of smaller operations of a like character. The total length of the road from South Ferry to Fifty-ninth street is 5.17 miles.

A typical section of one track showing conduit, track and carrier pit, etc., is shown in the accompanying drawing. Above Thirty-fifth street the tracks are 10 ft. $\frac{1}{2}$ in. from centre to centre, instead of 9 ft. $\frac{1}{2}$ in. as shown. The train rails are of girder section, and weigh 91 lbs. a yard. The slot rails have a Z section, are 7 in. high, and weigh 67 lbs. a yard. Gauge of track is 4 ft. 8 $\frac{1}{2}$ in. The width of excavation necessary for the double track was 15 ft. depth, 3 ft. at yokes and 4 ft. at manholes. The foundations of the carrier pits, yokes and pavement are of Portland cement concrete 6 in. in thickness. There is also 6 in. of the same concrete around the conduit. The concrete is made of one part of Portland cement to three parts of sand, and five parts of broken stone; the stone used must pass through a 2 $\frac{1}{2}$ in. ring and not through a 1 $\frac{1}{2}$ in. ring. The yokes are set upon a concrete foundation 45 in. long, 18 in. wide, and 6 in. deep. The top of the foundation is 30 in. below grade. The yokes themselves are 23 in. high from bottom to rail, extreme height, 27 $\frac{1}{2}$ in.; weight about 550 lbs. Yokes are spaced 4 ft. 6 in. from centre to centre. The height of the steel lining plate is 17 in.

The carrier pits are 42 in. long, 37 in. wide, and 42 in. deep, and are spaced 31 ft. 6 in. from centre to centre. The carrier sheaves are 24 in. in diameter.

This road will be operated on the duplex cable system, two independent cables being carried in the conduits. As a rule, only one will be in operation at a time, the other being kept in reserve. The grips will be so arranged as to engage with either cable at will. The cables will be driven from three power stations. The uptown station, at Fifty-first street, will operate a single loop of cable from the station south to a sheave pit between Thirty-sixth and Thirty-seventh streets, thence north to Fifty-ninth street and return to the station, a total distance of 2.24 miles. From the Houston street station a loop will extend to Bowling Green and back, a distance of 3.58 miles, and another loop from the station to the sheave pit between Thirty-sixth and Thirty-seventh streets and back, a distance of 3.86 miles. The Front street station will operate the loop from Bowling Green around through State street, up Whitehall street to Broadway, .66 miles. The cables will be of about the following lengths: Fifty-ninth to Thirty-sixth, 14,000 ft.; Thirty-sixth to Houston, 21,000 ft.; Houston to Bowling Green, 19,000 ft.; Battery loop, 3,500 ft., and will all be of 1 $\frac{1}{2}$ in. in diameter.

The buildings used for the Fiftieth street power house were formerly occupied as the car stables, and occupy the block on Sixth avenue between Fiftieth and Fifty-first streets, extending back toward Seventh avenue about 200 ft. The rear part will be used as a boiler room and the front for the engines and cable machinery. The engine room will be 200 x 105 ft. on the floor and 65 ft. high. The power plant will consist of two simple non-condensing Corliss engines, with 36-in. cylinders and 60-in. stroke, rated at 1,000 H. P. when running at 60 revolutions per minute with 150 lbs. initial pressure. These engines are built by the Dickson Manufacturing Co., of Scranton, Pa. The fly wheels of these engines are 24 ft. in diameter and weigh about 100,000 lbs. The main shaft terminates in a coupling, by means of which it may be engaged with a driving shaft carrying a drum 26 ft. in diameter, grooved for 20 two-inch Lambeth cotton ropes. These drive a similar drum on the main shaft

as shown in the plan, from which the power is taken off to either of two shafts which carry the cable winding drums, the transmission being from a 9-ft. driving drum on the main shaft to a 32-ft. receiving drum on the cable winding shaft, by 34 two-inch cotton ropes. The cable drums are 12 ft. in diameter as will also be the rest of the lead sheaves. The tension cars will have a travel of about 35 ft. and the strain on the cable when in use will average about 1,200 lbs. An average of about 2,000 H. P. will be required to operate the whole road,

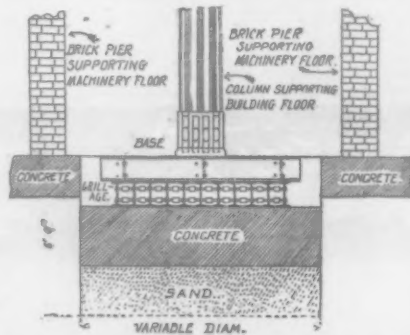


Fig. 1—Foundations of Power Building at Houston Street.

although nearly three times that amount can be used in case of emergencies. The cable will be run at a speed of about 6 miles per hour.

The power plant at the Houston street station will be similar to that at the uptown power house, except that there will be two sets of two engines each having cylinders of 36-in. diameter and 60-in. stroke, rated at 1,200 H. P. at 60 revolutions per minute with 150 lbs. initial pressure. The general arrangement of the Houston street station is shown in the accompanying plan.

The engines for the Front street station have not yet been decided upon, but will probably be of about 250 H. P. each.

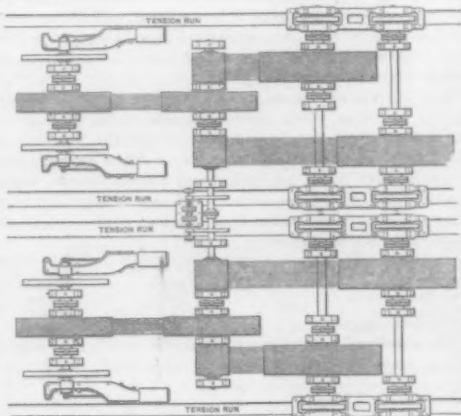


Fig. 2—Plan of Power Plant at Houston Street.

The cars used on this line will be of a different pattern from the ordinary New York street car. They will be 30 ft. 6 in. long and 7 ft. 6 in. wide, have a 3 ft. 6 in. passage through the centre and double doors opening on platforms about 6 ft. long. These cars are built by the John Stephenson Co. and weigh about 8,000 lbs. each.

The foundations of the Houston street power-house present some features of interest. In the construction of this building it was necessary to isolate the foundations of the floor carrying the cable machinery from those of the ten-story office and mercantile building to

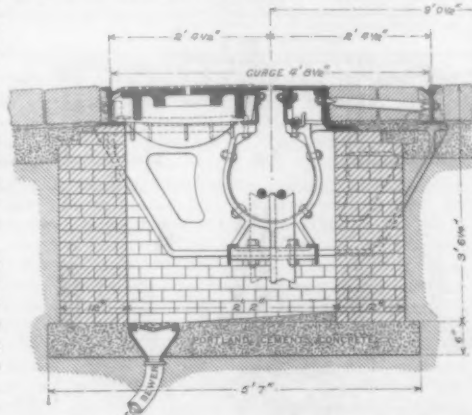


Fig. 3—Cross Section of One Track Through Yoke.

be erected on the same ground. The method adopted is as follows: The foundations rest on a bed of sand. The exterior piers, 28 in. number, supporting the walls, are steel columns resting on a grillage of iron bars supported upon stone walls set on a bed of concrete. The interior piers supporting the floors are 45 in. number and are constructed in this manner: Iron cylinders 6 ft. in depth and varying in diameter from 8 ft. 6 in. to 12 ft.

are sunk into the sand bed and partially filled in with the same material; upon this filling a thick bed of concrete is placed and resting on the concrete a grillage of iron bars, which support the cast iron base of the columns supporting the floors of the main building. The machinery floor is supported on brick piers resting on a bed of concrete over the sand foundation and is isolated from the piers supporting the main building.

The object of the iron cylinders is to prevent the sand foundations of the main columns from spreading laterally, and to divide the sand which supports the main building from that which supports the machinery floor, so that the vibration of the machinery will be transmitted to a separate foundation from that of the main building.

The entire work of the cable road is under the supervision of Major G. W. McNulty, Chief Engineer of Construction. If no unforeseen delays occur it is expected to have the road in operation from Fifty-ninth street to Bowling Green by Jan. 1 next.

New Band Resawing Machine.

A specially solid and compact machine of this type is shown in the accompanying cut. The wheels are 54 in. in diameter with steel shafts, cast iron hubs, steel spokes, malleable iron shoes and rubber-covered wood rims. All the usual adjustments for both lower and upper wheels are easily made while the machine is in operation, and the speed of the feed rolls may be varied as desired. The reducing gears for the feed mechanism have a differential gear, by which a reduction in speed of 36 to 1 is obtained in the space ordinarily occupied by a single pair of bevel gears.

The feed rolls are six in. number, all positively driven. Both the lower and upper wheel guides are of the revolving disc pattern, the back of the saw resting against the face of a steel disc 5 in. in diameter at a little distance from the edge, so that a maximum bearing surface is obtained with the slightest possible friction, owing to the revolution of the disc under the pressure of the saw. The upper disc is adjustable in position by a rack and pinion. The capacity of the machine is for stock 24 in. wide and it will cut to the centre of 10 in. thick. A number of minor points make this resawing machine one of the most complete in the market. The makers, the John A. White Co., of Dover, N. H., also make a band resawing machine with 48 in. wheels, with a tilting table. The saw is set so close to the feed rolls that 6 in. stock may be easily handled in these machines. The one shown weighs 3,500 lbs. It is built according to the standard of the John A. White Co.'s apparatus, every part being numbered and interchangeable.

The New England Roadmasters' Association.

ANNUAL MEETING.

The tenth annual convention of this Association was held at Springfield, Mass., beginning on Wednesday, Aug. 24.

The first session was called to order at 2 p. m., President F. C. Clark in the chair. About 30 members were present. President Clark briefly addressed the meeting, directing attention to the general character of the preceding nine conventions, and giving prominence to the fact that the papers and discussions at these meetings had resulted in much good to the members individually and to the roads which they represented. He referred also to the banquet to be held in the evening, to which, at this meeting, the representatives of the various railroad supply firms and the members of the technical press present had been invited. The Secretary's report gave the receipts and expenditures of the Association, showing a cash balance on hand of \$272. A brief discussion was had as to the status of several members who were no longer in the employ of railroads. It was decided that such should still be considered active members.

The election of officers for the ensuing year, next in order, resulted as follows:

President, C. B. Lentell (Boston & Albany); Vice-President, F. Holbrook; Chaplain, E. W. Horner; Secretary, G. L. R. French (office Northampton). Messrs. W. T. Mosher (B. & A.), F. C. Clark (Housatonic), S. B. Bodwell (Boston & Maine) and F. E. Sibley (New York, New Haven & Hartford) were elected as additional members of the Executive Committee.

The first committee report was that of Messrs. E. E. Stone (B. & A.), E. K. Post (N. Y., N. H. & H.) and J. R. Patch (Conn. River), on "Comparison of Heavy Rail Sections with Light. Should There Be an Increase of Labor to Roadbed to Get Full Life and Value from Use of the Heavier Rail?" The committee were of the opinion that it does not require on the whole an increase of labor with the larger rail sections, although it may require an increase of labor in the straightening, curving and handling preparatory to and at the laying of the rail. They thought that this difference would be nothing compared with the labor saved in the natural life of the rail. A stronger and stiffer splice joint being used with the heavier rail, it helps to keep the joint on the same plane with the rest of the rail, decreasing the pounding so detrimental to the life of all rails.

The committee presented, as they had been requested to do, the following list of questions pertinent to the main question:

1. What should be the maximum weight of rail? 2. What proportion should the base of the rail be to the

height? 3. Should the same number of ties be used to the mile with the heavy rails as with the light? 4. Would there be a need of tie plates with the heavy rail to get full value from the ties?

Before entering upon any discussion of this report, it was concluded to have the various other committee reports submitted. Accordingly, Messrs. S. Greer (N. Y., N. H. & H.), J. W. Shanks (New London Northern), and J. W. Torr, presented their report on "Small Culverts and Cross Drains." They recommended that: 1. The best material for small culverts is stone laid in cement. 2. They should be arched when practicable. 3. Culverts should be either flagged in the bottom the entire length, or paved with stone set on edge, and the interstices filled with cement grouting. 4. Cross drains should be constructed of sound plank, either white oak, yellow pine or chestnut. The committee then submitted the following ten questions in regard to small culverts and cross drains: 1. What is the best method of covering small culverts, when not practical to arch over? 2. Shall small culverts be opened or cov-

put down on the Central Vermont is 5 in. high, with a breadth of base of $4\frac{1}{2}$ in. This breadth he considered entirely insufficient. Mr. J. W. Drew also was decidedly in favor of heavy rail sections, taking the stand that the heavier rails not only lasted longer, but that they were less destructive to the ties. Mr. G. W. Bishop thought that the heavy rails would not entail any appreciable disadvantage in point of convenience and ease of building. As regards the maximum weight of rail section advisable to use, a number of figures were given by different members, Mr. Drew favoring from 75 to 90 lbs. per yard, and Messrs. W. T. Mosher and J. W. McManama (Fitchburg) from 95 to 100 lbs.

Mr. E. K. Post stated that on the New York, New Haven & Hartford 72-lb. rails had been used for 10 years with good results, the rails being $4\frac{1}{2}$ in. high with a $4\frac{1}{2}$ in. base. He did not think that a 100-lb. rail would prove more satisfactory than one weighing only 85 lbs. The latter, in his opinion, was ample for any New England road. Any excess of weight above 85 lbs. per yard he considered to represent money practically thrown away.

Mr. W. H. Merrill (Central New England & Western) favored an 80-lb. rail. The 60-lb. rails used on the Boston & Maine, he stated, rapidly wore out, bending in many places under the heavy engines. He used from 2,300 to 3,000 cross ties per mile of track.

Mr. Bishop thought that a height of 5 in. and a base of 6 in. would be desirable if it were possible to roll such a rail, the weight to be from 90 to 100 lbs. Mr. Shanks agreed with this, stating that a rail of such proportions was what he had advocated for the past 10 years.

The discussion from this point turned on the difficulties of rolling such rails at a uniform temperature and securing a uniform texture of the material, the stand being taken by some that rolling mill men did not care to turn out such wide base rails because too many second quality rails were produced in rolling. Mr. Post was of the opinion that a rail 5 in. high and with a base measuring from 5 to $5\frac{1}{2}$ in. was fully as good as a rail with a 6-in. base. Mr. Lentell was in favor of a 6-in. base, claiming that with that width tie plates could be satisfactorily dispensed with.

In discussing the third part of the report on rail sections—that relating to the number of cross ties per mile to be used with heavy rails—Mr. Lentell stated that for 90-lb. rails the ties should be about 2 ft. apart from centre to centre, making about 2,000 ties per mile of track. Mr. W. E. Clark thought that from 2,600 to 3,000 ties per mile of track was not sufficient on some sections. At some places on his road he used 3,200. He had under his care a number of six-

degree curves, on which high speeds (from 40 to 50 miles an hour) were common, and on these, he maintained, the more ties that could be used the more satisfactory would be the results. The opinion generally expressed by those who took part in the discussion was that 3,000 ties per mile was about right, and that the spaces between the ties should be wide enough to readily permit the use of a shovel.

The question as to the need of tie plates, with the heavier rails and wide base, in order to get full value from the ties, brought out a number of interesting points though, in some respects, the discussion was irrelevant. Thus Mr. W. E. Clark explained that he had in use on his line some white cedar ties which exceed ten years of service, and had outlived two sets of chestnut ties. Mr. McManama similarly stated that he had some cedar ties in use in good condition after twelve years of service. In an experimental way he had used some old cedar and some new chestnut ties on the same section, alternating the ties, and he found that the chestnut ties gave out long before those of cedar, cutting very rapidly where the rails rested on them. Mr. Drew's experience with cedar ties was equally favorable. He had used hard pine ties, but found that unless they were bored before driving spikes they frequently split. Touching on the particular point involved—that of the use of tie plates—Mr. Lentell thought that by using such plates the life of a tie could be generally prolonged by a period of from two to three years.

The banquet in the evening formed a most pleasant closing number of the day's programme. An interesting feature of it was the presentation to Mr. W. F. Ellis, for seven years secretary of the Association, of a handsome album containing the photographs of many of the members of the Association. The presentation speech was made by President F. C. Clark, and Mr. Ellis responded to it, giving, in the course of his remarks, some statistics showing the growth of the Association. Brief speeches were made by many other members and guests until a late hour.

THURSDAY.

Mr. W. F. Ellis, formerly Roadmaster of the Providence & Worcester, presented a paper on light and heavy rails in relation to track work. He showed sections of the standard rails of many of the New England roads, and pointed out the changes, not merely in weight of metal but in its distribution for wear and for stiffness. The sections shown included the Boston & Albany 95-lb. rail, the New York & New England 75-lb., the Central Vermont 75-lb., all designed by Mr. Dudley on the lines which the reader of the *Railroad Gazette* has been made familiar with. The Michigan Central, the Philadelphia & Reading, and other recent and well known types were also shown. Mr. Ellis' argument was that as bends in these stiff sections cannot be so easily treated as in light sections they should be prevented by careful track work. That is, to give their full value they should be laid on a properly ballasted and drained road-bed, on good ties promptly and adequately cared for.

There was no discussion on the paper, and President Clark proceeded with the appointment of committees on resolutions on the several regular and main topics of the meeting, which had already been discussed in part, viz., heavy rail sections; material and form for small culverts and cross drains; fire damage; and the effect of using cheap and inferior tools and materials.

While the several committees were preparing their reports, the discussion of the question regarding culverts and cross drains was taken up in the meeting. Mr. W. E. Clark held that culverts, 2 ft. wide, should be at least 4 ft. high, so that a man could easily walk through them. He advocated covering them over with granite slabs, on top of which there should be from 18 to 24 in. of gravel as a bed for the ties. He was not in favor of open culverts of any kind. Mr. Drew was in favor of arching over culverts, and Mr. Post stated that on his road brick arches were being extensively used. Mr. Otis, of the New York Central, in response to a request explained that he was using much heavy iron pipe instead of stone for culverts under 4 ft. Such pipe, with a good incline, affords a clean, smooth surface, and is not so apt to catch sticks, leaves and other rubbish. For covering stone culverts he frequently used rails instead of stones. Mr. Lentell stated that the Boston & Albany was now putting in such iron pipe in many places for shallow culverts. Sometimes two pipes were used instead of one. Between the pipes and the ties he puts about 12 in. of gravel.

Mr. Patch said that for culverts measuring less than 3 ft. he used cast iron pipe, but for larger culverts he employed stone. Where a culvert promised to measure more than 5 ft. he used two culverts with a central pier. In general, he would avoid open culverts. Mr. Bishop stated that the Fitchburg used iron pipe for culverts of less than 36 in. The pipe, with a good pitch, proved to be clean and highly satisfactory. Mr. W. E. Clark described a method which he had followed in putting a wrought iron pipe through an earth bank by means of hydraulic jacks. The first section of pipe was laid in a trench cut into the side of the bank, and the remaining sections were put on the ends, one after another, and the whole was pushed forward by the power of the jacks, somewhat after the manner in which tunneling in soft ground has, of late years, been so successfully practiced. There was also a short, somewhat rambling discussion as to the comparative costs of pipe and stone culverts, from which it appeared that there was not much difference between the two.

In the matter of cross drains, Mr. Patch recommended that such drains should be open boxes, 12 in. square, made of 2-in. chestnut plank. Such drains he thought were not necessary on straight sections of road, but on curves there should be one in every 400 ft. He strongly opposed closed or pipe drains because of the difficulties from freezing and clearing out. An open drain would be readily cleared by the use of pick and shovel.

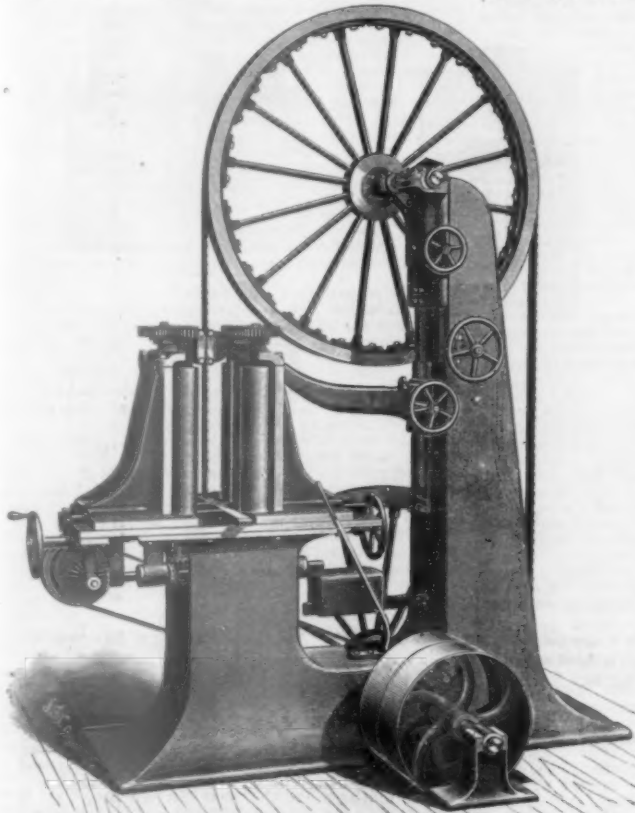
The report on "Fire Damage," by Messrs. Bishop, Collins and Clark (W. E.) then came up for consideration, and, on motion, was accepted without discussion. Following this, Mr. Patch, of the Connecticut Railroad, invited the Association to an excursion on that road to Greenfield and return, the train to leave at 4 p. m. The invitation was accepted.

Boston was then chosen as the place for the next annual meeting, to be held on the third Wednesday in August.

A brief report on "The Use of Cheap and Inferior Material and Tools" was next in order, but elicited no discussion. A number of different topics such as switches, frogs, track-bolts, etc., were presented after this and were briefly disposed of.

The committee which had been appointed to prepare resolutions on the rail section question submitted the following:

Resolved, That this report of the regular committee be accepted as the sense of the convention, and that the four questions asked in it be answered as follows: 1. The weight of rail shall be at least 85 lbs. per yard for the heavy traffic of the present time. 2. The height of the rail shall not exceed the width of base, and, if it be possible to properly so roll a rail, the width of base shall exceed the height. 3. The same number of ties per mile shall be used with heavy rails as with light ones. 4. Tie plates shall be used with all present dimensions of rails, thus prolonging the life of ties to an extent that will more than pay for the tie plates, besides affording



BAND RESAWING MACHINE.

Made by the JOHN A. WHITE CO., Dover, N. H.

ered? 3. In covered culverts, what depth of ballast should there be, between top of covering and bottom of ties? 4. In small open culverts, what is best material and form of stringers for same? 5. Shall small open culverts be guard-timbered so as to avoid trouble in case of derailment? 6. How near together shall ties be placed on small open culverts and should guard timbers be placed on ties, locking same in position? 7. What proportion shall the width be to the height? 8. How far apart shall cross drains, or water boxes be placed (on double track)? 9. Shall cross drains or water boxes be open or covered? 10. What is the best method of protecting ends of culverts from undermining and to prevent water from getting behind the wall?

Following this came the report of Messrs. G. W. Bishop (Fitchburg), W. E. Clark, (Vermont Valley), and R. P. Collins on "Fire Damage: How to Lessen the Number of Fires, and Best Method of Adjusting Claims."

The committee recommended that the location be cleared of all old ties, plank and bark, and kept so by removing all old material as fast as renewals take place; that all brush, weeds and grass be mowed between the middle of July and middle of September and burned as soon as possible after cutting; that smoke-stack netting should be thoroughly examined at the end of each trip as much as any other part of a locomotive; that the section foremen be provided with proper blanks to give full particulars of all fires, and that they be required to fill one out for each and every person who has had property damaged by fire and promptly forward same to the roadmaster of his division for his approval, after which the claim agent should take charge of the settlement of the same.

The discussion of the first report, on rail sections, was opened by Mr. J. W. Shanks, who declared himself heartily in favor of heavy sections, because of the increase in late years in weight of rolling stock. A point to which he directed special attention was that the rails in use had not sufficient breadth of base to satisfactorily meet present requirements. The 75 lb. rail now being

the other advantages derived from the use of such tie-plates.

The committee of resolutions on "Small Culverts and Cross Drains" reported as follows:

Resolved, That all small culverts should be covered, and all cross-drains open: **Resolved,** That all culverts up to 4 ft. in diameter should consist of one or more cast iron pipes laid on a sharp incline; the ends set in faces of good rubble masonry, laid in cement, and to have not less than 1 foot of ground beneath the bottom of the ties: **Resolved,** that iron pipe is as cheap and more serviceable than stone. Cross-drains are to be of 2 in. plank, oak or chestnut, and of a width to go between two ties.

THURSDAY AFTERNOON.

President Clark presented a number of minor topics for consideration, prominent among them being that on the length and spread of frogs. Mr. W. E. Clark, in connection with the subject, offered a resolution that it was the sense of the convention that 6 ft. should be the extreme length of all frogs not exceeding No. 6 size.

The secretary read a communication from the Roadmasters' Association of America, inviting the New England Roadmasters' Association to attend its meeting at Chattanooga, and Atlanta, Ga., Oct. 18 to Oct. 20. The programme of that meeting included visits to St. Augustine, Jacksonville, Savannah and Charleston. It appeared likely that a sufficient party could be made up by the New England Roadmasters to worthily represent the Association at this meeting, and the details of the necessary arrangements were left in the hands of Secretary French.

EXHIBITS.

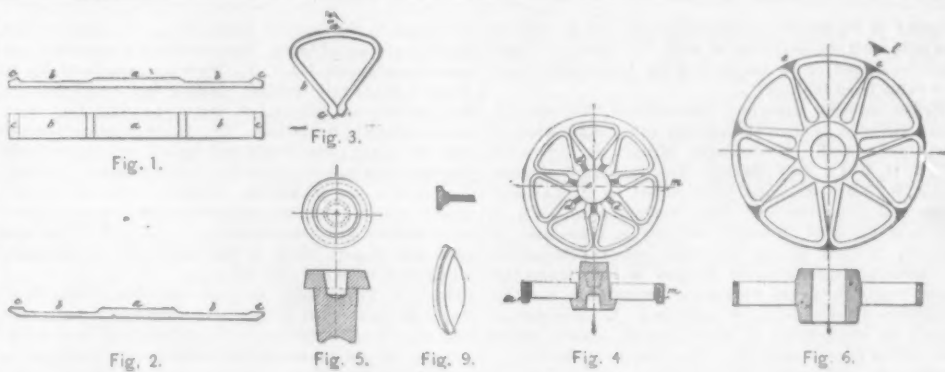
American Washer & Mfg. Co., Newark, N. J., samples of nut lock washers.
Bush Cattle Guard Co., Kalamazoo, Mich., full size section of cattle guard.
Bush Interlocking Bolt Co., Philadelphia, Pa., section of tracks with bolts applied.
Q & C Co., Chicago, Ill., Servis tie plate, Bryant metal saw Continuous Rail Joint Co., Newark, N. J., samples of continuous rail joint.
Dilworth Porter & Co., Pittsburgh, Pa., samples of the Goldie "perfect railroad spike."
Elastic Nut Co., Milwaukee, Wis., samples of elastic nuts.
Fairbanks, Morse & Co., Chicago, Ill., track jacks, hand car wheels, etc.
Joyce, Cridland & Co., Dayton, O., track jacks.
Keegan & Halpin, New York, N. Y., the "Wells Light."
McMullen Woven Wire Fence Co., Chicago, Ill., samples of railroad fence.
National Lock Washer Co., Newark, N. J., samples of nut locks.
National Surface Guard Co., Chicago, Ill., model of cattle guard.
Pneumatic Gate Co., Chicago, Ill., photographs of gate.
Positive Lock Washer Co., Newark, N. J., samples of lock washers.
Rampart Iron Works, Hillburn, N. Y., switch stands.
Reinforced Rail Joint Co., Boston, Mass., section of rail with joint.
Ruffner & Dunn, Philadelphia, Pa., samples of nut locks.
Sheffield Velocipede Car Co., Three Rivers, Mich., hand cars.
Standard Nut Lock Co., Newark, N. J., samples of nut locks.
J. H. Sternberg & Sons, Reading, Pa., samples of Harvey grip track bolts.
Wier Frog Co., Cincinnati, O., photographs of switches and frogs; samples of rail braces.
The Truss Rail Joint Co., Chicago, Ill., full sized truss joint.
American Nut Lock Co., St. Louis, Mo., samples of nut locks.
Shoulder Tie Plate Co., Philadelphia, Pa., samples of shoulder tie plates.
American Railway Equipment Co., New York, the Servis tie guard and lock washers.

The Baume-Marpents Method of Forging Wheels.

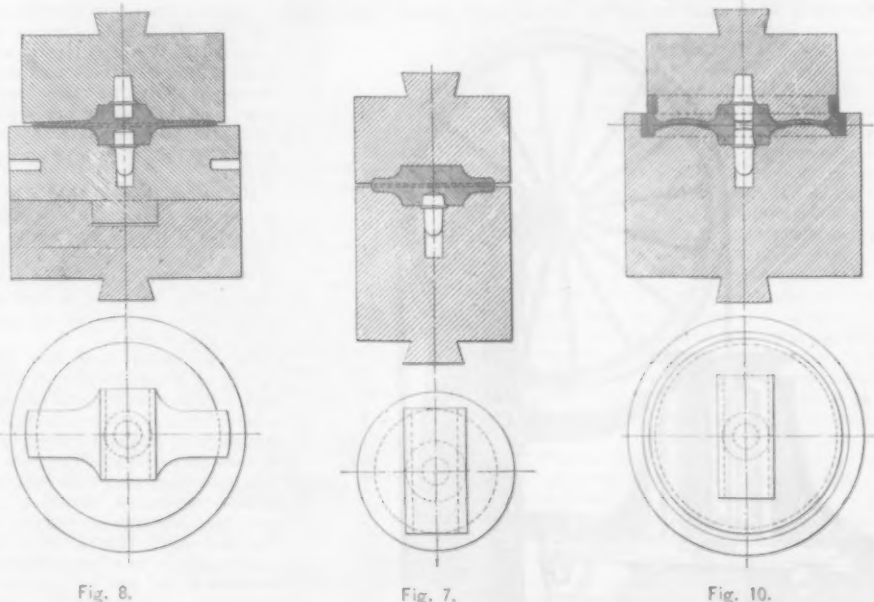
The Baume-Marpents Foundry Co., Limited, of Belgium, is manufacturing forged wheels of the solid disc and double spoke pattern, as shown in figs. 1 to 10. The double spoke wheel is known in Europe as the Russian or Brunon type. The method of manufacture is quite interesting as the wheels are turned out complete with the minimum number of heatings. A description of the process of manufacture is as follows:

The wheels are forged from blanks in dies or formers carried on the anvil and head of a large steam hammer. For the spoke wheel, a rough blank formed as in fig. 1, is finished as shown in fig. 2, after which it is bent into shape (fig. 3), by special machinery. Referring to figs. 1, 2 and 3, that part of the blank designated by *d* forms the rim, *bb* make the spokes, and *cc* becomes part of the hub; see fig. 4. Six of the bent forms, fig. 3, are assembled in a hand or shell, *m*, fig. 4. The filling or spacing pieces, *d*, fill the interstices between the ends of the spokes where they join the hub. The hub, fig. 5, which is formed in dies to the shape shown, and the assembled spokes with shell, *m*, are then placed in separate forges and heated to a white or welding heat, care being taken that only the ends (*c*) of the spokes are heated to welding heat. The hub is then placed in a die on the anvil of a hammer, and the spokes are laid over it, as shown in fig. 4. A few strokes of the hammer welds the hub and spokes together and shapes the hub, as shown by dotted lines in fig. 4. The fin remaining in the hub between the holes (see fig. 4) is punched out while the hub is hot. Filling pieces, *f*, fig. 6, are welded in either by hand or by steam hammer. After leaving the forge in the form shown in fig. 6, the wheels are sent to the finishing shop. The spokes not being heated beyond a red heat, the iron remains in good condition and retains its elasticity and fibre. This method of welding insures a practically solid wheel.

To make a disc wheel, an iron billet rough forged and of the proper weight and dimensions is heated to a white heat and formed with a steam hammer having dies of the shape shown in fig. 7. This is the first rough form, and is called the hub and disc. A second set of dies gives the blank the shape shown in fig. 8. It is now ready for the rim, fig. 9, which is a rolled section



Baume-Marpents Wheel Forging Process.



Baume-Marpents Wheel Forging Process.

and is formed to the exact diameter by a special machine. After placing the rim on the disc, a third set of dies gives the wheel the form shown in fig. 10.

Train Accidents in the United States in July.

COLLISIONS.

REAR.

1st, 3 a. m., on Pittsburgh, Ft. Wayne & Chicago, at Millbrook, O., a west bound passenger train ran into the rear of a preceding freight, wrecking the engine, caboose and 3 cars. The fireman was injured. It is said that the freight engineer entered upon the main track on the time of the passenger train; the freight conductor tried to stop the passenger train, but could not get back quick enough.

3d, on Philadelphia & Reading near Bellevue, Pa., a passenger train broke apart between the tender and the car next behind it, and the cars afterward ran into the engine, derailing some of them. It would appear that the brake power was more effective on the engine than on the cars.

6th, on New York, Lake Erie & Western near Jersey City, N. J., a freight train ran into some passenger cars standing on the main track. The engineer was injured.

7th, on the Long Island road at Dunton, N. Y., a passenger train which was stopped by a signalman was run into at the rear by a following passenger train, badly damaging several cars. Two passengers injured.

8th, on Lake Shore & Michigan Southern at Dorset, O., a mixed train broke in two on a descending grade and the rear portion was run into by a following freight, 20 cars being piled up and making a bad wreck. One passenger was killed and the conductor, fireman and 1 passenger badly injured. Most of the passengers jumped out of the windows before the freight train struck the passenger car.

13th, on Philadelphia, Wilmington & Baltimore, near Elkton, Md., a freight train broke in two and the rear portion afterward ran into the front portion, derailing several cars and fouling the adjoining main track. The wreck was run into by a north bound freight train and a brakeman was injured.

15th, on Chicago, Rock Island & Pacific, near Topeka, Kan., a freight train ran into a coal car, which had been blown out of a side track, making a considerable wreck. The fireman was injured.

20th, on Burlington & Missouri River, near Plattsmouth, Neb., a freight train broke in two and the separated portions afterward came together, wrecking 12 cars of grain. Three tramps were killed.

20th, on New York Central & Hudson River, near Tribes Hill, N. Y., a freight train ran into the rear of a preceding freight, wrecking the engine and 8 cars. Fireman injured.

20th, on Georgia Pacific, near Woodlawn, Ala., a freight train broke in two and the rear portion afterward ran into the forward part, injuring 2 brakemen.

20th, on Chicago, Burlington & Quincy at Cromwell, Ia., a stock train running at high speed ran over a misplaced switch and into some freight cars standing on a side track, wrecking the engine and 7 cars. One brakeman was injured.

22d, on Atchison, Topeka & Santa Fe, near Lampasas, Tex., a freight train broke in two and the rear portion portion afterward ran into the forward one, throwing 12

cars into the ditch. A tramp stealing a ride was injured.

25th, on West Jersey Road, at Glassboro, N. J., a train of empty passenger cars ran into the rear of an accommodation train ahead of it, wrecking 1 car of the foremost train. Engineer and fireman injured.

26th, on New York & New England, at Stormville, N. Y., a freight train ran into the rear of a preceding train, derailing 10 cars and killing a tramp. It is said that the foremost train failed to send back a signal.

27th, on Southern Pacific, near Sacramento, Cal., a passenger train ran over a misplaced switch and into a car standing on a side track, damaging the engine considerably. One passenger was injured.

30th, on Boston & Maine, at Tewksbury, Mass., a passenger train standing at the station was run into by an excursion train which approached at uncontrollable speed, badly damaging 2 cars. One passenger was injured.

31st, 4 a. m., on Philadelphia & Reading, in Philadelphia, an express train ran into the rear of a freight which had been delayed, wrecking the caboose and 2 freight cars and derailing the express engine. The freight brakeman and passenger fireman were injured. The passenger train was running slowly in accordance with the special order which had been given on account of the detention of the freight, but the freight brakeman was asleep in the caboose.

31st, on Chicago, Milwaukee & St. Paul, at the Union Station in Milwaukee, Wis., the section of passenger train No. 51, which was just starting out of the station, was run into by the second section of the same train, which was just coming in from Chicago. The cause of the collision is said to have been a misplaced switch. The second train was loaded with excursionists from Chicago, of whom 2 were killed and 6 others were injured.

And 15 others on 13 roads, involving 5 passenger and 20 freight and other trains.

BUTTING.

2d, on Illinois Central near Watson, Ill., butting collision between a passenger and a freight train, wrecking both engines, the baggage car and 4 freight cars; both engineers injured. It is said that the freight train was ordered to meet the passenger train at Mason but that the conductor and engineer in reading the order called the word "Watson."

7th, on Wilmington, Columbia & Augusta near Wilmington, N. C., a locomotive left unattended for a few minutes mysteriously started off and ran 4 miles to Navassa where it struck the head of a passenger train standing near the station. The fireman of the passenger train was killed by jumping and 1 passenger was injured. It is said that the runaway locomotive had been left with the reverse lever in the centre, so that it must have been started maliciously.

9th, 2 a. m., on Pennsylvania road near Landisville, Pa., butting collision between an east bound passenger train and a west bound train of empty sleeping cars. The collision occurred on a bridge and both engines were badly damaged but did not fall from the bridge. One baggage car was wrecked. The baggage master was injured. It is said that the east bound train ran past an appointed meeting point.

12th, on Union Pacific near Highbridge, Idaho, some cars of a switching train got away from the brakemen in consequence of a brake chain giving out, and ran some distance down grade into the head of a passenger train. The fireman was killed and engineer injured.

13th, on Columbus, Hocking Valley & Toledo, near Alveda, O., butting collision between a work train and an empty engine. Both engines were badly wrecked and one engineer hurt.

15th, 2 a. m., on Cincinnati, Hamilton & Dayton, at Connersville, Ind., butting collision of freight trains on a bridge, wrecking 20 cars, 13 of which fell into the river. Two trainmen were injured.

17th, on Louisville & Nashville, near Bardstown Junction, Ky., northbound passenger train No. 4 collided with southbound freight train No. 3, badly wrecking the front portion of both trains. Engineer, fireman and baggage master injured.

18th, on Pittsburgh & Lake Erie, near Reynoldton, Penn., butting collision of freight trains, badly damaging both engines and several cars. One fireman was killed.

22nd, on Illinois Central, at Ponce de Leon, La., butting collision between a southbound passenger and a northbound freight train, making a bad wreck. Two trainmen were injured.

24th, on Columbus Southern, near Albany, Ga., a passenger train ran over a misplaced switch and into the head of a freight train standing on a side track, badly damaging both engines and several cars. The conductor and 4 passengers were injured.

25th, on Chicago & Eastern Illinois, near Brazil, Ind., butting collision between a freight and a passenger train, badly damaging the engines and injuring 1 engineer.

27th, 2 a. m., on Atchison, Topeka & Santa Fe., near Earle, Col., butting collision of freight trains, one of which was drawn by two engines. All the engines were badly damaged and 1 engineer was injured.

27th, 5 a. m., on Rome, Watertown & Ogdensburg, near Caledonia, N. Y., butting collision between an east bound passenger and a west bound freight train, wrecking both locomotives and several cars in each train. Engineer and 2 other trainmen injured. The freight train was running on the passenger train's time.

28th, on Chicago, Burlington & Quincy, near Ottawa, Ill., butting collision between a north bound passenger and a south bound freight train, wrecking the engines and 2 passenger cars; 1 passenger was injured.

28th, on Chicago & Northwestern, at Logan, Ia., butting collision between freight trains, damaging both engines and several cars; a man stealing a ride was badly injured.

20th, at 3 a. m., on Kansas City, Fort Scott & Memphis, at Pendleton, Kan., butting collision between freight trains, due to the forgetfulness of the conductor and engineer of the north bound train. The wreck was a bad one and 1 engineer was killed. There was a dense fog at the time.

And 9 others, on 9 roads, involving 5 passenger and 13 freight and other trains.

CROSSING AND MISCELLANEOUS.

17th, at 2 a. m., on Lake Shore & Michigan Southern, at Vermillion, O., an eastbound express train ran into some freight cars which had been left standing partly on the main track, badly damaging the engine, 2 freight cars and 1 passenger car. Engineer and fireman injured.

22d, on Nashville, Chattanooga & St. Louis, at Winsted, Tenn., a freight train entering a side track to clear the road for a passenger train was struck in the side by the approaching passenger train, derailing several cars and blocking the road all night. Three trainmen were injured.

20th, on New York Central & Hudson River, at East Albany, N. Y., collision of switching trains at a crossing in the yard, injuring a conductor.

27th, on Burlington & Missouri River, at Indianola, Neb., collision between a passenger train and a freight which was backing into a side track but did not clear the main track soon enough. Two engines and one baggage car damaged; one engineer and one fireman injured.

29th, on Philadelphia & Reading, near Shamrock, Pa., collision between freight trains badly damaged 2 engines and 8 cars. It is said that the collision was caused by one of the trains becoming uncontrollable on a descending grade. A man stealing a ride was killed and 2 trainmen and 2 others were injured.

30th, on Union Pacific, near Idaho Springs, Col., a passenger train was struck in the side by a coal car on a side track, which seems to have started, from some unknown cause, just as the passenger train was passing. The engine, the mail car and two passenger cars successively came in contact with the coal car and the third and fourth passenger cars were overturned. Twelve passengers were injured.

30th, on Pennsylvania road, at 30th street, Philadelphia, a northbound passenger train ran into a wrecking train, wrecking the tool car and several others; the passenger engine was overturned. The fireman and 3 brakemen on the wrecking train were injured. The passenger engineer states that he received a clear signal at the entrance of the block section.

31st, on Cincinnati, Hamilton & Dayton, in Cincinnati, O., an excursion train of the Cincinnati, Hamilton & Dayton collided with a freight engine of the Cleveland, Cincinnati, Chicago & St. Louis, wrecking the freight engine. The runner of this engine was killed and the fireman badly injured.

And 17 others, on 14 roads, involving 7 passenger and 23 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

25th, on Ohio River, near Proctor, W. Va., a freight train broke through a trestle which had been weakened by a freshet, and the engine and 29 cars were wrecked. Engineer, fireman and one brakeman injured.

And 9 others, on 9 roads, involving 1 passenger and 8 freight and other trains.

DEFECTS OF EQUIPMENT.

1st, on Western New York & Pennsylvania near Mayville, N. Y., passenger train No. 1 was derailed and the engine and baggage car overturned. A mail clerk was injured. It is believed that the derailment was caused by a broken wheel.

7th, on Lehigh Valley road at South Wilkesbarre, Pa., 25 cars of a freight train were derailed by the breaking of an axle, making a bad wreck. The breakage occurred immediately after the brakes had been suddenly applied by the engineer in consequence of the engine having run over a boy.

10th, on New York, Lake Erie & Western near Otisville, N. Y., 9 cars of a freight train derailed by the breaking of an axle under a Swift refrigerator car. One brakeman was killed.

13th, on Queen & Crescent, at Lumberton, Miss., 13 cars of a freight train were derailed by the breaking of an axle, making a bad wreck. The fireman was slightly injured.

24th, on Great Northern, near Great Falls, Mont., a freight train was derailed by a broken wheel, 17 cars being thrown over a bank. Fireman badly injured.

25th, on New York, New Haven & Hartford, at South Lyme, Conn., the engine and some of the cars of a passenger train were derailed. It is said that a broken wheel was the cause of the accident. The engineer was killed and 2 other trainmen injured.

28th, on Norfolk & Western near Rileyville, Va., a car in a freight train was derailed by the breaking of a wheel just as it approached a trestle. The conductor and rear brakeman at once saw the trouble and jumped off in a cut, and both of them were killed.

And 15 others on 12 roads, involving 4 passenger and 12 freight and other trains.

NEGLIGENCE IN OPERATING.

6th, on Baltimore & Ohio near Thornport, O., a freight train was derailed by a misplaced switch, 10 cars being derailed. Engineer and one brakeman injured.

10th, on Pittsburgh, Ft. Wayne & Chicago at Glenfield, Pa., the eastbound New York & Chicago limited express was derailed at a facing point switch, the whole train running some distance on the sleepers. The train was running rapidly, but no person was seriously injured. The switch is at the entrance of a third track, and it appears that the attendant who expected a freight train moved it just as the engine struck it, the front wheel crushing the detector bar when it was in mid-position.

12th, on Chicago & Northwestern, near Clinton, Ia., a freight train was derailed by running over a misplaced switch, and five cars were wrecked. The fireman was killed and the engineer injured.

14th, on Louisville, Evansville & St. Louis, near Evansville, Ind., the rear car of a passenger train loaded with excursionists was derailed by a misplaced switch and overturned. Twelve passengers were injured, 2 of them fatally. It is stated that the switch was thrown under the train just before the last truck reached it.

17th, at the crossing of Philadelphia & Atlantic City and the West Jersey, near Atlantic City, N. J., a passenger train approaching on the former road was thrown off the derailling switch and the engineer and the fireman were slightly injured. It appears that the signalman at the crossing became confused on the simultaneous approach of two trains and turned the switch immediately in advance of the train.

20th, on Rio Grande, Western, near Pleasant Valley Junction, Utah, a freight train became uncontrollable on a steep grade and was derailed. One brakeman was killed.

25th, on Wisconsin Central, at Chicago, Ill., an empty passenger train running into the station was not properly controlled, and struck an empty passenger car with sufficient force to drive it over the headblock at the end of the track and into a crowd of excursionists waiting to take a train. Twelve of these people were injured.

30th, on New York, Ontario & Western, at Rockport, N. Y., a freight train was derailed by a loose rail, and the engine and five cars were wrecked. The engineer was killed. It is said that the trackmen were repairing the track, and that a signal had been properly placed to stop the freight train.

28th, on Chicago & Northwestern at Evanston, Ill., a passenger train ran over a misplaced switch, badly damaging the engine and derailing several passenger cars. The engineer and fireman were injured.

And 6 others on 6 roads, involving 2 passenger and 4 freight and other trains.

UNFORESEEN OBSTRUCTION.

1st, on Iowa Central, at Oakville, Ia., a freight train ran over a horse, derailing the engine and 5 cars. The engineer was killed.

3d, 2 a. m., on Wabash road, near Keller's, Ind., a freight train was derailed by a washout caused by a sudden "cloudburst," and the engine and 9 cars were wrecked. The engineer, fireman, trainmaster, a line-man and bridge superintendent, all on the engine, were killed.

9th, on Louisville & Nashville, near Mt. Pleasant, Tenn., a freight train was derailed by running over a cow, 11 cars being derailed. One brakeman was killed.

14th, on Baltimore & Ohio, near Wheeling, W. Va., the engine and several cars of a freight train were derailed by a large rock which had rolled upon the track. Engineer injured.

16th, on Southern Pacific, at Bakersfield, Cal., an engine and 11 cars of a freight train were derailed by running over some cattle. A brakeman and 2 tramps were killed.

16th, on Northeastern, at Florence, S. C., a passenger train was derailed at a washout and 2 trainmen were killed and 2 passengers injured.

20th, on Valley Railroad of Ohio, near Myersville, O., the engine and baggage car of a passenger train were derailed, injuring the engineer and fireman. It is said that there was a broken bolt on the rail, which caused the engine to jump the track.

22d, on West Shore road, near Esopus, N. Y., a car in a freight train was struck by lightning, causing the wreck of the car and the derailment of several others.

23d at 10 p. m., on Baltimore & Ohio, near Chicago Junction, O., a freight train struck a hand car and the engine was derailed, causing a bad wreck, 15 cars being derailed. Two trainmen were killed and 1 injured.

24th, 1 a. m., on Florida Central & Peninsular, near Drifton, Fla., a mixed train was derailed by sand which had been washed on the track during a heavy rain and the whole train was derailed. The fireman was killed and the engineer injured.

And 8 others on 8 roads, involving 6 passenger and 2 other trains.

UNEXPLAINED.

4th, on Louisville Southern, near Tucker, Ky., an excursion train, carrying 250 passengers, was derailed, most of the cars being overturned and thrown down a bank. Two employees were killed and 8 passengers injured. Fire broke out about half an hour after the derailment and the whole train, except the baggage car, was burned up.

8th, on Texas & Pacific near Terrell, Tex., a cattle train was derailed, making a bad wreck in which 2 tramps were killed and another injured.

8th, on Chicago, Milwaukee & St. Paul, near McGregor, Ia., 10 cars of a circus train were derailed; 2 men injured.

9th, on Cape Fear & Yadkin Valley, near Parkersburg, N. C., a freight train was derailed and the engineer injured.

11th, on Cleveland, Cincinnati, Chicago & St. Louis, at Cincinnati, O., the engine of a freight train was derailed, injuring a brakeman.

20th, on Rome, Watertown & Ogdensburg, at Norwood, N. Y., a passenger train ran into the rear of a preceding passenger train, damaging the engine and 1 car. Engineer and 3 passengers injured.

30th, on Birmingham, Sheffield & Tennessee River road, near Lynn, Ala., a freight train was derailed and 11 cars wrecked. One trainman was killed and 2 injured.

21st, on Central New England & Western, at Gallatinville, N. Y., a freight train was derailed, wrecking 13 cars. One brakeman was injured.

30th, on Louisville & Nashville, near Gadsden, Ala., a car in a freight train jumped the track and, with 6 others, was derailed and wrecked. One train man was killed and 2 others injured.

30th, on Duluth, South Shore & Atlantic, near Marquette, Mich., 3 cars of a passenger train were derailed and overturned down a bank; the wife and 2 children of a track laborer were standing where the train fell, and 2 of them were killed. Four passengers were injured.

And 29 others, on 22 roads, involving 7 passenger and 23 freight and other trains.

OTHER ACCIDENTS.

26th, on Cincinnati, Hamilton & Dayton, near Deshler, O., both the parallel rods of the locomotive of a passenger train broke while the train was running at high speed, badly injuring the fireman.

29th, on Pennsylvania road, at Philadelphia, Pa., a cylinder of the locomotive of a freight train exploded, injuring a girl sitting on a doorstep near the railroad.

And 3 others, on 3 roads, involving 3 passenger trains. A summary will be found in another column.

Effect of Temperature on the Strength of Car Axles.*

In the third paper on the subject of "Effect of temperature on the strength of railway axles," Mr. Thomas Andrews, M. I. C. E. (England) has given the data obtained by his experiments. The conclusions drawn from these tests compare closely with some results found in actual service that are cited in the paper. In the tests 18 axles were subjected to a cold test, as follows:

The axles were allowed to cool gradually to a temperature of normal rigidity; that is the atmospheric temperature at the time they were made. They were then buried separately in about 30 tons of snow for various periods of time. When the axles were removed from this they were placed in a cooling cage surrounded by a large quantity of freezing mixture composed of two parts of snow and one part by weight of salt, for 13 hours, or until the metal had become cooled to zero, Fahrenheit. They were then placed in an axle drop on bearings 3 ft. 6 in. apart and subjected to one blow from a one ton weight falling from a height of 5 ft. The extent of deflection between the bearings was carefully taken after each blow. The axle was placed in the freezing mixture for 15 minutes after each blow was delivered, so as make sure that its temperature was 0 deg. throughout the tests. The operation was repeated until fracture occurred.

Warm tests were made with 11 axles. After forging, these axles were allowed to cool to a temperature of normal rigidity and were then placed in a large water bath, which was gradually raised to 100 deg. F. Each axle was then removed to the drop test and immediately tested in the usual manner, one blow being given and the deflection measured. After each blow the axle was placed in the bath 15 minutes. In general, these tests were made in the usual manner of drop tests, the axle being turned half way over after each blow.

The results of these experiments show that at a temperature of 0 deg. F. the total average mean force of 179½ tons was sufficient to cause the breaking of the axle, and at a temperature of 100 deg. F. the total average mean force of 428½ tons was necessary to fracture; that is, the resistance to concussion at a temperature of 0 deg. was about 42 per cent. of what it was at 100 deg. The average total deflection at zero was 6.48 in. as against 15.06 in. at 100 deg. This represents a reduction of flexibility under the drop test of about 57 per cent.

The author of this paper gives the following conclusions on the whole series of observations made in connection with these tests, which have been proceeding during the last seven years.

1. The impact tests with an "energy" of 10 foot-tons on axles at a temperature of 212 deg. F. compared with the results at 7 deg. F., indicated an increase of endurance at the higher temperature of about 255 per cent.

2. The impact tests with an energy of 15 foot-tons on axles at a temperature of 120 deg. F., compared with the results at 7 deg. F., showed an increase of endurance at the higher temperature of nearly 120 per cent.

3. The impact tests with an energy of 10 foot-tons on axles examined at a temperature of 100 deg. F., when contrasted with results obtained at 7 deg. F., demonstrated an increase of resistance at the higher temperature of about 43 per cent., and this increase was within certain limits in proportion to the increase in temperature.

4. The impact tests with an energy of 5 foot-tons of axles at a temperature of 100 deg. F. gave an increase of resistance of about 138 per cent. compared with results on axles similarly tested at a temperature of 0 deg. F.

5. The impact experiments with an energy of 2½ foot-tons applied to axles with a temperature of 100 deg. F. compared with experiments at 0 deg. F. showed an increase of resisting power to concussion at the higher temperature of nearly 88 per cent.

The author also found that when axles were subjected to a number of heavy blows the extent of deflection was more during the earlier blows under same temperature than a deflection produced by later blows; that is, the elastic limit of the axles had increased. The progressive decrease of deflection was more clearly shown where the impacts were made at temperatures of 212 deg., 120 deg. and 100 deg. F., but it was not observable when the axles were at a temperature of 0 deg.

* From a paper read by Mr. Thomas Andrews before the Institution of Civil Engineers, London, in 1891.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A few weeks ago we mentioned two cases in which, as we had been informed, spikes had been sheared off by rails laid on Servis tie plates. We cited these cases because the Q & C Company asked for a specific and public statement of any such incidents that we might know of. After careful inquiry we learn that the heads of the maintenance-of-way departments of the two railroads concerned do not know of such a thing having happened on their respective systems, and at tribute no accidents to that cause. This seems to settle those two cases. In the entire absence of evidence that spikes did shear we are bound to believe that they did not. In fact, it is probably true that there were no Servis plates in use where those accidents happened. On the other hand, we have positive evidence from a railroad where the plate is in use on heavy grades, and on curves of from 6 to 12 degrees, that it is giving admirable service. The president of the road says: "We have had no trouble from spreading of guage, nor is there any tendency for the rail to cant. There is no wear perceptible on the foot of the rail, nor are any other bad effects apparent." Positive testimony from such experience must have the great weight which it deserves. We have never hesitated to express our belief in the value of this tie plate, and shall be glad to get such further evidence for or against it as our readers who have used it are willing to give. Our business is to promote good railroading, and to that end we must have facts.

The New Jersey Injunction in the Reading Case.

A lively interest in the Philadelphia & Reading consolidation was aroused on Friday last by the announcement that Chancellor McGill of New Jersey had decided against the legality of the combination and had issued his injunction against its further consummation. The decision has been received with a great deal of popular satisfaction, as tending to destroy, if not actually destroying, an alleged unlawful conspiracy to enhance the price of coal at the expense of the many for the benefit of a few.

The Reading "deal" involved a lease of the Central of New Jersey to the Port Reading Railroad (practically owned by the Philadelphia & Reading), a tripartite agreement between the Central, the Port Reading and the Philadelphia & Reading, and also a lease of the Lehigh Valley to the Philadelphia & Reading. As all three of the principal companies control the production as well as the transportation of large quantities of anthracite coal, most people believed that the aim was to weaken or destroy outside competition so as to increase the profits of the companies, and this has not been seriously denied; but the railroad officers loudly asserted that they were not coal producers. This was a mere quibble, however. Had it been entirely clear that the scheme was only to operate the roads in question simply as carriers, for their mutual benefit as carriers, with no ulterior purpose to regulate the price of one of the necessities of life, this combination would not, we apprehend, have

excited the popular clamor it has, nor incurred the unceasing hostility of the New York daily newspapers. The consolidation of railroads is now too common and too beneficial to the public as well as to the owners, to attract even special attention, much less resistance on the part of the public, in ordinary cases.

The charges of unlawful monopoly were so vigorously pressed that proceedings were instituted by the Attorney-Generals of New Jersey and of Pennsylvania to test the legality of the leases, and the outcome of the first of these proceedings to be brought to a hearing is now before us in the decision of Chancellor McGill. Attorney-General Stockton, of New Jersey, brought the proceedings on behalf of his State, to have declared void the lease of the Central to the Port Reading and the tripartite agreement between these two companies and the Philadelphia & Reading, on the ground, substantially, that the laws of New Jersey did not allow the leasing of one railroad to another without express legislative sanction, and on the further ground that the combination tended to create a monopoly of the anthracite coal trade and thereby prevent competition and increase the price of that commodity to the inhabitants of the State.

The companies denied that the agreements were invalid for either of the reasons stated, and particularly set forth that neither of them owned any coal lands, or produced or dealt in coal. But it was admitted that the Reading owned a majority of the stock of the Reading Coal & Iron Company, and that the Central owned a majority of the stock of the Lehigh & Wilkesbarre Coal Company. The questions to be decided came up before the Chancellor on a motion for an injunction to restrain the defendant companies from carrying out these agreements, pending the final judgment of the Court in the premises. This is the common form in which many of these important public questions are disposed of. It is preliminary in character, and does not conclusively indicate the final judgment of the Court to be pronounced upon all the evidence which may be adduced at a formal trial. At the same time it is a matter of common observation that such an interlocutory order often becomes the final decree of the Court, in cases where both sides make the first encounter the great battle of the controversy, and for that purpose exhaust all their resources in the first engagement. Upon the evidence before him the Chancellor held that the lease of the Central was in direct violation of the law of 1885, which prohibits the leasing of any railroad corporation organized under the laws of New Jersey, without the consent of the Legislature first obtained. This act requires, in addition to other matters, that where such a lease is proposed, a draft of it shall be submitted to the Legislature. It was not contended in this litigation that the formalities of this statute were complied with or even attempted, and it is difficult to imagine how the companies could expect to carry their lease over this bar unless they relied upon its being unconstitutional. This certainly was a convenient way to be rid of the difficulty, but unfortunately his Honor did not share this view of the infirmity of the statute. On the contrary he seems not to have entertained any doubt that the law was constitutional.

The decision on this point disposed of the leases, and substantially determined the invalidity of the whole arrangement. But, as if to leave no doubt on the subject, the Court considers at some length the charge that the combination was made to secure monopoly and prevent competition in the coal trade. The Chancellor was of opinion that these features in the case evince a much more serious public danger than the mere infraction of a positive statute against a transfer of corporate privileges without legislative sanction. In addressing himself to this point, his Honor points out that the companies interested constitute two of the six great anthracite coal carriers, and by the lease of the Lehigh Valley three of the six are controlled by the combination, along with more than one half of the entire anthracite coal region. He characterizes it as disguise and evasion for the railroads, in view of these facts and their ownership of the majority of stock of the coal companies, to deny that they are the owners of coal lands or producers of coal. And he finds the fact to be, whatever may be the nominal ownership or the legal title, that the railroad companies stand as the owners of the coal lands, for the substantial purposes of the suit before him. He says:

Here, then, we have great coal dealers complaining that they are not sufficiently paid for the produce of their mines, so combining that already they control more than one-half of the coal fields upon which this State depends for fuel, and looking to the co-operation of the remaining anthracite coal producers to effect a change in the price of their output, that they may have more satisfactory returns from their investment. To say that these conditions do not tend to a disastrous monopoly in coal would be an insult to intelligence. It is possible that such a monopoly may be used, as the de-

fendants suggest, to introduce economies and cheapen coal, but it does violence to our knowledge of human nature to expect such a result.

This conclusion from the facts being made, the simple question of law then remained: Was such a combination within the legal power of a New Jersey corporation to effect? Fundamental principles of general corporation law deny such power to corporations and the laws of New Jersey do not constitute an exception. From the earliest times the law has been jealous of the exercise of unauthorized, questionable or dangerous functions by corporations, and where such powers have been usurped, or threatened, the courts have been swift to bring into play the powerful machinery of injunction and to ultimately decree a forfeiture of corporate franchises as a penalty for such corporate offenses. The case under view illustrates the application of these principles.

The Chancellor issued his injunction against any further observance of the lease or performance of the tripartite agreement. This restores the *status quo* prior to the practical consolidation which was so promptly made, pending the final decree and the appeal, which, we learn, will be taken. Under the injunction order the Central is required to resume control of its property and franchises, and the Reading and the Port Reading are each restrained from interfering in any way whatever with the affairs of the Central.

President McLeod, of the Reading, is reported to have said that "the decision will have as much effect as if the injunction was directed against the Sioux Indians." In his formal statement for publication he qualifies this observation by conceding that the practical operation of the Central will be at once surrendered by the Port Reading. But this, he states, cannot have the effect of changing or disarranging the traffic arrangements in any way, and as the ownership of an absolute majority of the Central stock is held by the friends of the Reading, the continuance of the joint operation of these properties is permanently assured. He further claims that the decision will have no effect upon the coal trade or the plans of the parties in the combination.

We cannot but think President McLeod is mistaken on these points. If we understand the effect of this decision, it is that the Court, being satisfied that an unlawful combination exists, will leave no means untried to break it up and destroy its effect. The scrutiny of Courts of Equity is very powerful in such cases. It is not hampered by matters of form, but looks at the substance of things. It will not allow traffic arrangements any more than leases or tripartite agreements, or any other form of procedure, to interfere with its orders or prevent their due execution. Any connivance against, or collusive disregard of, its order is not tolerated for a moment, but is punishable with severe penalties of fine and imprisonment, or both. Its process runs against corporate bodies as well as individuals, against stockholders as well as officials, and not even the potency of ownership of a majority of stock, contrary to Mr. McLeod's notion, can withstand the irresistible engine of Courts of Equity. It is not safe even for a Sioux Indian to try conclusions with Equity Courts, and when their mandates begin to issue it is much the better plan to pursue the policy of "Brer Rabbit" in the story, and "lie very low." It is not unlikely that this will be the policy of the Reading. It is true that the entire destruction of the leases cannot prevent three different boards of directors from operating their roads together and treating each other in the most friendly manner; but the lack of legal permanency is a certain source of weakness to such a union. It does not appear that this decision will have any effect on the Lehigh Valley lease, most of that company's lines being in Pennsylvania, where the questions of law and the attitude of the State are different. The Reading would doubtless mourn the loss of the Lehigh Valley much more than the loss of the Central.

Dimensions of Recent Eight-Wheel Engines.

The following table gives the comparative dimensions of recent eight-wheel locomotives in this country, and shows the growth of what is called the American type of locomotive. The Baltimore & Ohio type is the largest and most powerful, although the New York Central, as a rule, hauls heavier trains: but the latter road has not such steep grades. Perhaps this table will give our English readers a good idea of the amount of power needed to haul American passenger trains over American roads; but it should be added that while the weight on drivers is very great, this weight is not necessary when running along the road, nor is it, as a rule, necessary in starting; but on each of the roads mentioned there are grades, and other conditions requiring the use of the whole weight, and fre-

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	Central of New Jersey.	New York Central.	Penna. R. R. Class O.	Baltimore & Ohio.	C. & M. & St. Paul.	C., B. & Q. Class A.	C., B. & Q. Class M.
Cylinders.....	19 x 24	19 x 24	18 x 24	20 x 24	16 x 24	18 x 24	18 x 24
Driving wheels, total diameter....	68 in.	78 in.	68 in.	78 in.	68 in.	68 in.	68 in.
Boiler, type of.....	Wagon top.	Wagon top.	Belpaire.	Wagon top.	Long wagon top.	Wagon top.	Belpaire.
Boiler, maximum diameter, barrel.	56 in.	58 in.	57 in.	58 in.	48 in.	52 in.	56 in.
Firebox, length inside.....	124 in.	96 in.	72 in.	107 1/2 in.	72 in.	72 in.	84 in.
" width inside.....	42 in.	41 in.	35 in.	33 3/4 in.	35 in.	35 1/4 in.	42 in.
Tubes, diameter outside.....	2 in.	2 in.	2 in.	2 in.	2 in.	2 in.	2 in.
" number.....	220	268	196	251	199	199	217
" length.....	145 in.	144 in.	142 in.	142 in.	132 in.	138 1/2 in.	138 in.
Grate area, sq. ft.....	98	129	127 1/2	143	115	112	111 1/4
Heating surface, firebox, sq. ft.....	1,400	1,692	1,156	1,544	891	1,078	1,301
" total, sq. ft.....	1,821	1,821	1,283	1,687	916	1,190	1,412 1/4
Weight on drivers, lbs.....	81,000	83,000	61,500	76,000	54,000	54,500	66,000
Weight on truck, lbs.....	29,000	40,000	36,500	40,000	32,000	28,500	34,000
Total weight, lbs.....	110,000	123,000	98,000	116,000	86,000	83,000	100,000
Boiler pressure, lbs.....	145	145	160	145	160	145	160

quently this is not enough. One day an engine may have a load of eight or nine cars, weighing about 300 tons, and perhaps the next day it may be snowing or raining, while the train load will be increased to twelve cars, or 500 tons. It is the great variety of work rather than the magnitude of the constant traffic, that demands these heavy engines. The small Chicago, Milwaukee & St. Paul 16 x 24 engines answer very well in good weather with an ordinary train, but when there are unusual conditions resort must be had to ten-wheelers having about 95,000 lbs. on the drivers, in order to make time.

The number of times in the course of a journey that a train must be brought down to a pretty low speed is quite large on most American roads, so that to regularly make the speed called for by the schedules of trains which do competitive business the engine has to be accelerating the speed a considerable portion of the time, and this, of course, requires all available power. Junctions that are not perfectly signaled, cases where freight trains have been slightly delayed, and meeting local passenger trains at stations with unfenced tracks, where passengers are getting off, are among the hindrances in this line. The number of places where new bridges or other alterations in the road are in progress is probably larger on the principal American roads than on those in England which run fast trains, as our roads began poorer and the traffic on them is growing faster. One road with no financial hindrances in this particular case has had to postpone some improvements on one division because new work is now in progress at so many different points that the annoyance is already as great as can be endured.

American railroad managers cannot accept the advice of their English critics and put lighter engines on their fast trains of comparatively small weight, because, in consequence of these hampering conditions, the trains would, for a considerable share of the time, fail to reach destination punctually. The conditions, to a London & Northwestern man, probably appear exceptional, but the American railroad manager has to treat them as everyday matters. He may be open to criticism for trying to haul too heavy trains over too steep hills or at too high speed through poorly signaled yards, in short, for trying too hard to give the passengers more than their money's worth; but the criticism lies against the superintendent's department or the signal engineer's, or the general passenger agent's rather than against the mechanical department.

The Chesapeake & Ohio.

The report of the Chesapeake & Ohio for the fiscal year, ending June 30 last, is out with commendable promptness and gives full details of operations and finances. On Jan. 8 last we published some notes on the company's lines and management, concluding that "the traveler who goes over the road with his eyes and his mind open cannot fail to be deeply impressed by the boldness of the projectors and the skill of the engineers of the original lines and by the great promise of the present property." The report before us shows that this latter impression was well founded. Gross earnings have increased in the aggregate and also per mile of road, being now twice what they were in 1887, the last year of the receivers. Gross earnings per mile were \$7,700 in 1890, \$8,700 the next year, and \$9,070 this year. Net earnings have increased in still greater proportion because economies of operation have been made possible through liberal yet judicious expenditures of money. The funds for improvements have been received from the sale of bonds, but also to an important degree from net earnings. About \$400,000 was taken for this purpose in 1891 and about \$500,000 in the year just closed. Bridges have been rebuilt and trestles filled at an expense of \$185,000; ballasting has been steadily carried on; \$156,000 was paid for 75-lb. rails, exclusive of labor; \$150,000 was expended upon new stations, and similar work and extensive renewals of equipment made at a cost of \$235,000—a remarkable record for a

road which was in such a condition four years ago that trains enough to earn interest on its debt could scarcely be moved over the road.

Some additional ballasting will be required and some 30 miles of second track through the mountains will be necessary after the 30 miles now under contract are finished. This will leave two short pieces of 5 miles each of single track on the Alleghenies, which, on account of the great cost, will not be changed at present. These improvements, with enlarged terminals and other betterments, will absorb about \$4,000,000 set aside, completing, it is expected, the heavy and expensive work. The money thus put into the property under the present management was indispensable if long trains were to be run; and to run long trains of cheap freight is the problem before the Chesapeake & Ohio. The great success so far achieved is encouraging and deserves to be studied by railroad men as a type of railroad possibilities in the United States, provided modern methods are strictly followed—that is, to haul large quantities of goods of low value at the lowest possible cost per unit. This, of course, demands the best condition of roadbed, the largest engines and the easiest grades.

The earnings of the Chesapeake & Ohio are, on coal to the seaboard, only 3 1/4 mills per ton per mile; on export grain to Newport News, also a low rate, the average on all freight being only 5.18 mills per ton mile. On the other hand, by the economies made possible through the improvements mentioned, the road can pull 30 cars of 25 tons each from the coal mines in West Virginia to tidewater, getting therefore \$.40 per ton. If we figure on carrying the coal cars back empty the earnings amount to \$1.30 per train mile both ways. As a matter of fact, by cultivating merchandise traffic westbound, the report shows an average train load of 268 tons, and earnings of \$1.39 per freight train mile—a result ample for profit even though the rate per ton mile is abnormally low. The total operating expenses were about \$1 per train mile; the cost of motive power being .168 cent per mile run; fuel was only .037 cent and repairs .044 cent. Repairs of engines averaged \$1,229 each, passenger cars \$404, and freight cars \$26 each, these sums being repairs only and not including renewals. During the latter part of the year (not included in the operating accounts) the company acquired possession of the small system of roads in Kentucky known as the Big Sandy. It also carried through a financial plan which substituted 4 1/2 per cent bonds for a part of the first and second preferred stocks, leaving the common (about \$60,000,000) as the only share capital. It is also stated that the net earnings of the properties now combined were last year equal to the estimated fixed charges for the coming fiscal year, leaving the expected increase as further profit.

Profit Sharing Again.

When a noisy dispute like that at Buffalo draws general attention to the subject, all the various remedies for strikes are brought to public notice. Among the opinions gathered by the reporters in this case was the following (addressed to stockholders) from Mr. Ingalls, President of the Cleveland, Cincinnati, Chicago & St. Louis and of the Chesapeake & Ohio:

"The problem of the future in railway management seems to be how to make a fair return to investors while rates are continually going down, and wages are increasing. A large portion of the time of your officers and managers is taken up meeting and consulting and discussing with the organized bodies of labor on the road the question of wages, etc. Your directors would recommend to the stockholders to consider the plan of establishing a community of interest with the employees. If the company has arrived at a financial position, as your directors think it has, where it can safely be expected to earn its fixed charges and a surplus, they would recommend that the surplus be equally divided with the employees.

"For instance, if your capital is \$90,000,000 and the wages of the employees in the year amount to \$5,000,000, let that be the rate of division. If your surplus earnings are \$650,000 a year it would be one per cent. for the stockholders and one per cent. to the employees. An employee, then, who had served for the entire year without accident caused by his own negligence would receive his one per cent. on the amount of his pay.

"As the earnings of the company increase the percentage will be still larger. In any event, the employees

would still receive regular compensation and would also share to some extent in whatever prosperity the company had. Wherever this has been tried in manufacturing companies it has worked well and has also been successfully adopted on one of the French railways."

Mr. Ingalls concludes by recommending that the stockholders appoint a committee to consider the matter and to take such measures as will legalize any action of the directors in that line.

This is given as a leaf from Mr. Ingalls' annual report as President of the Chesapeake & Ohio, though we do not find the passage, or any trace of it, in our copy of the report. We have seen no denial, however, of its authenticity as expressing the views of Mr. Ingalls, and as it has been taken up and discussed by the newspapers and has been made the text of interviews with other railroad managers, who in the kindness of their hearts talk with the newsgatherers who are short of "copy," it is worthy of passing notice. The problem is an important and serious one, for any change from the usual methods of paying men is sure to affect the finances of a railroad and the feelings of its employees in a marked degree; but the views here given are stated in such a superficial way that if they are not to be regarded as mere clap-trap we must conclude that very little study has been given to the subject. A great deal of money has been transferred first and last under profit-sharing schemes, and yet there is no agreement, in this country at least, on any rules by which any of them can be adopted and made useful in large concerns where competition, legislation, or other powerful influences make the conditions at all delicate. This being the case, a railroad manager owes it to his stockholders to be very explicit in any proposal he may make on the subject. The Chesapeake & Ohio is a prosperous road and well managed, but it is not scattering dividends around very freely as yet, and so is not entirely out of range of the fling that was cast on the Toledo, Ann Arbor & North Michigan, and the St. Louis, Alton & Terre Haute when they proposed profit sharing—that there are no profits to share. But we will let that pass.

The trouble with ninety-nine out of every hundred of these schemes, even many that have been successful, is that they are inequitable. The employees do not receive their money according to the energy or skill manifested by them individually, and the company does not derive the benefit that it should from the expenditure. This fault is often glaring and in such cases will surely bring the experiment to an end in time, even if apparent success has continued several years. Mr. Ingalls says that an inflexible dividend scheme has worked well in manufacturing establishments wherever tried, but this statement needs modification; the influence on many of the establishments has been like that of the well known doctor on a certain patient—he "cured him until he died."

What does this offer really hold out? The Chesapeake & Ohio has a funded debt of 55 millions, and some preferred stock; and the common stock amounts to about 58 1/2 millions. The other liabilities are considerable, so that we may say that about half of the capital must be compensated before labor comes in for any dividend at all. Is this right? We do not say that it is wrong, but the query is at once suggested whether four-fifths, or one-fifth, would not be just as near right as one-half. Who shall say? Then on the employee's side: why is one year's salary the proper sum to assume as the laborer's capital? On a road paying ten per cent. dividends this would make a violent change in the amount of the pay rolls. On a road with a large amount of bonds and a small amount of stock the fluctuations might prove a considerable disturbance. The presence of any considerable amount of "water" in the stock at once vitiates all honest calculations.

Suppose a Chesapeake & Ohio employee receiving \$600 a year does have the prospect of receiving \$6, or even \$12, at the end of the year, how much influence will it have on his conduct? While not disparaging the spirit of faithful men, we are compelled to say that experience teaches that a very large share of any body of men would be influenced so little that the change would not be discernible. Premiums to engineers and firemen for fuel saving, which resemble ordinary profit-sharing plans as closely as anything of the kind that has ever been thoroughly tried in railroad service, are found to have but little effect on a majority of the men as soon as the system has been operated long enough to bring the premiums down to a reasonable rate. Big premiums work all right for a while, but nobody will claim that profit sharing is going to afford more than very moderate emoluments to the employees. And the expenditure of even a small sum is not unfeared, of course. The sum mentioned by Mr. Ingalls, though not great on a 1,000-mile road, earning \$8,000 a mile, is yet large enough not to slip through without the watchful attention of hard headed directors.

The most serious complaint made by employes in factories, etc., who receive dividends, is of unfair dividing. This emphasizes the necessity of complete publicity of accounts, if such a scheme is to succeed. Railroads probably do not favor the capitalist at the expense of the laborer any more than does the average manufacturing establishment, but, being in their nature more public, their sins are more talked about (except in Presidential campaigns), and they would therefore need to be more circumspect if they undertook to take employes into partnership.

The true way to share profits is to increase the pay of the best men and decrease the pay of the poorer ones. We have learned nothing during the past year to alter the views expressed in our article of June 12, 1891, speaking of the proposition made by the St. Louis, Alton & Terre Haute. As we then said, profit sharing offers very little to cure the evil of machine methods in disciplining men, and that is the worst evil in the management of railroad employes. The great need of railroad management in this respect is a closer relation between the manager and the workman. The desideratum here, as in all other business, is to pay dividends to the best men, who will return the amount in more efficient service, and to coincidentally show that the work of the other men does not deserve the same recompense; which implies, of course, that these men ought either to improve their abilities or resign. Profit sharing has never done much in this respect. It is in itself a machine method, a scheme for favoring the employes without first investigating to see whether they deserve to be favored—a laborious process. Mr. Ingalls mentions the large amount of time that he and his assistants have to give up to discussions with employes; but there is no help for this as long as employes are human. And we wonder if the aggregate amount of time spent is any greater than it was when railroads were smaller concerns, and superintendents talked directly with individual employes more than they do now.

In so large and complicated a concern as a railroad, an enterprise which is closely watched by the public for the purpose of keeping the profits always down to the minimum limit, we do not believe horizontal profit sharing can do much good. It is greatly to be regretted that railroads cannot pay their non-union men higher wages, and much more to be regretted that every station agent, section master, watchman or laborer who is exceptionally faithful cannot be paid a slight premium; but as long as presidents must be governed in rates by sharp competitors, and must, for their own reputations, try to pay dividends as good as those paid by the sharp managers, superintendents can increase pay rolls but slowly. The few who do pay premiums, and who find profit in so doing, are very slow, we find, in extending the system. As for such highwaymen as those strikers at Buffalo, we cannot imagine that any one would seriously think of paying them anything in the shape of a dividend.

July Accidents.

Our record of train accidents in July, given in this number, includes 83 collisions, 104 derailments and 5 other accidents, a total of 192 accidents, in which 45 persons were killed and 150 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	Butt.	Crossing	Other.	Total.
Trains breaking in two.....	10	1	1	1	13
Misplaced switch.....	7	1	1	1	10
Failure to give or observe signal.....	3	1	1	1	6
Mistake in giving or understanding orders.....	1	7	1	1	10
Miscellaneous.....	4	3	1	1	9
Unexplained.....	8	14	12	1	35
Total.....	33	25	25	5	88
DERAILMENTS:					
Broken rail.....	1	1	1	1	4
Loose or spread rail.....	4	1	1	1	7
Defective frog.....	4	1	1	1	7
Defective wheel.....	3	1	1	1	6
Broken axle.....	3	1	1	1	6
Broken truck.....	3	1	1	1	6
Failed brakebeam.....	1	1	1	1	4
Defective throttle.....	1	1	1	1	4
Defective coupler.....	1	1	1	1	4
Misplaced switch.....	9	1	1	1	12
OTHER ACCIDENTS:					
Cylinder explosion.....	1	1	1	1	4
Broken side rods.....	1	1	1	1	4
Various breakages of rolling stock.....	1	1	1	1	4
Other causes.....	1	1	1	1	4
Total.....	104	5	5	5	119
Total number of accidents.....	192				192

A general classification shows:

	Col-	Derail-	Other	Total.	P.C.
	lisions.	ments.	acc'd'ts.		
Defects of road.....	10	1	1	12	6.2
Defects of equipment.....	11	22	3	36	18.7
Negligence in operating.....	37	15	3	55	28.6
Unforeseen obstructions.....	1	18	2	21	10.9
Unexplained.....	34	39	1	74	38.4
Total.....	83	104	5	192	100

The number of trains involved is as follows:

	Col-	Derail-	Other	Total.
	lisions.	ments.	acc'd'ts.	
Passenger.....	45	23	4	72
Freight and other.....	97	74	1	172
Total.....	142	107	5	254

The casualties may be divided as follows:

	Col-	Derail-	Other	Total.
	lisions.	ments.	acc'd'ts.	
KILLED:				
Employes.....	3	24	1	28
Passengers.....	3	2	1	6
Others.....	5	6	1	12
Total.....	11	32	3	46
INJURED:				
Employes.....	48	28	1	77
Passengers.....	36	20	1	57
Others.....	3	14	1	18
Total.....	87	62	3	152

The casualties to passengers and employes, when divided according to classes of causes, appear as follows:

	Pass.	Pass.	Emp.	Emp.
	killed.	injured.	killed.	injured.
Defects of road.....	1	1	1	1
Defects of equipment.....	1	1	1	1
Negligence in operating.....	5	30	6	54
Unforeseen obstructions and maliciousness.....	1	3	14	5
Unexplained.....	1	17	1	8
Total.....	9	52	23	77

Twenty-nine accidents caused the death of one or more persons each, and 51 caused injury but not death, leaving 112 (53 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with July of the previous five years shows:

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions.....	83	73	81	72	61	61
Derailments.....	104	91	59	65	85	53
Other accidents.....	5	5	6	3	10	3
Total.....	192	169	146	140	156	117
Employes killed.....	29	29	47	29	48	19
Others killed.....	16	63	23	10	12	17
Employes injured.....	77	91	116	73	92	107
Others injured.....	73	131	133	74	77	167
Passenger trains involved.....	82	67	64	62	63	54

Average per day:

	1892.	1891.	1890.	1889.	1888.	1887.
Accidents.....	6.19	5.45	4.81	4.61	5.06	3.77
Killed.....	1.45	2.97	2.26	1.26	1.93	2.13
Injured.....	4.84	6.81	8.03	4.71	5.45	8.74

Average per accident:

	1892.	1891.	1890.	1889.	1888.	1887.
Killed.....	0.234	0.544	0.469	0.273	0.392	0.569
Injured.....	0.781	1.254	1.672	1.028	1.077	2.317

The three accidents fatal to passengers in July were at Dorset, O., on the 8th; Milwaukee, Wis., on the 31st, and Evansville, Ind., on the 14th. The first of these is the only one which was attended with the usual spectacular circumstances which cause public discussion. It was on a road which has had some severe lessons in the matter of rear collisions; but it was not on the main line and that fact may perhaps afford a hint as to the reason why it does not show evidence that the lessons of the past have been heeded. The main lesson of the other two cases is the need of interlocking, distant signals, detector bars, etc., but very likely the question of the introduction of these improvements may be in such a state (especially at such a place as the scene of the Evansville accident) that the more important immediate lesson is one concerning discipline. At Milwaukee a jury found that the number of switchmen on duty was insufficient, and that the use of telephones for ordering train movements led to, or was likely to lead to, carelessness. While we must be cautious about placing too much dependence on the conclusions of juries, these hints are not without their value. Communication by telephone is apt to lead to relaxation of safeguards unless the men are closely watched, as the putting of communications in writing is not so convenient as where the telegraph is used.

The number of passengers killed in July is in marked contrast to the record for July, 1891, which was the worst month, excepting two, for the last six years. The most fatal accident in the present record is that at Kellers, Ind., on the 3d. The train in this case was not only running slowly, about seven miles an hour, but the men on the engine, who were killed, were out for the very purpose of looking for damage to the road. The coroner reported the accident as unavoidable, the culvert which was washed out having stood for 40 years, and the rainfall on the night of the accident having been heavier than anything before known in the vicinity.

A slight derailment on the Brooklyn, Bath & West End road on the 18th led to a report by the New York State Railroad Commissioners in which it was found that a large number of sleepers on the road were "in a deplorably rotten condition." A rear collision at Bellevue, Pa., on the 3rd is suggestive of an important point in brake equipment which is probably neglected on a good many roads. The spectacle of a train breaking in two and the rear portion running into the forward portion, in consequence of there being better brake power in front than at the rear, will probably be seen occasionally in freight service for some time to come, but an occurrence of this kind in the passenger service is not at all creditable to the men concerned. Among the derailments from misplaced switches this month will be found two, one on the tenth and one on the 17th, each of which occurred at points where there was an efficient interlocking system. In both cases the confusion of mind which led to the towerman's blunder was doubtless due to plain disregard of simple rules.

There were two bad butting collisions in Canada in July; one on the Grand Trunk, near Merriton, Ont., at 2 a. m., on the 18th, and one on the Bay of Quinte road, near Tamworth, on the 21st. Each accident caused the

death of three persons and the injury of a good many more. In the Grand Trunk case a coroner's jury found that neither train had air brakes, and that there were dangerous discrepancies in the timepieces at the several stations. The verdict seems to indicate also that telegraph operators are overworked. Here again we must be cautious about accepting jurymen's judgments, but we know of roads where these strictures would apply, whether they are just at Tamworth or not. In the other case a conductor had an imperfect watch, and the jury finds "that the rules of the road admit of so many different interpretations that conductors and engineers cannot be expected to fully understand them when compared with the orders issued from the superintendent's office." Near Sicomous, B. C., on the 20th, the through westbound express on the Canadian Pacific was derailed on a curve and the whole train wrecked; but, according to the reports, no one was killed. The interesting feature of the report is that the delay of the train amounted to about 24 hours, an incident illustrating the (occasional) cheapness of stop-overs when traveling through a wilderness.

Near Fish's Eddy, N. Y., on the 3d, the runner of the second engine on a double header freight train failed to obey signals and was found dead in his seat. Near Fort Worth, Tex., on the 15th, seven workmen on a gravel train went to sleep under their car on a side track and all of them were run over in the night, a freight train having backed against their car; three of the men were killed. An engineer and a fireman of a freight train on the Pittsburgh, Cincinnati, Chicago & St. Louis, while waiting on a side track on the night of July 5, lay down on the ground with their heads on the rail of the main track and fell asleep; a train came along and struck them, killing one and badly injuring the other.

We have accounts of one collision and two derailments on electric street roads in July, at Brooklyn, Coney Island and Chicago respectively, injuring about 20 people in all. In one derailment the cause is given as a broken rail and in another it appears to have been fast running; the collision was caused by a defective or misplaced switch. Among the accidents at street crossings in July were three, which together caused the death of ten people. In the first case (at Wurtsboro, N. Y.) a freight train made a flying switch in the dark without giving any audible or lantern signal. In one of the other cases (near Newark, N. J.) a freight train was switching on a crossing where there was no gate or flagman, but it was in broad daylight.

Anyone watching the development of vehicles for street railroads will be impressed with the erratic character of the "progress" made. Take, for instance, the matter of long and short wheel bases. Nearly every road has to try the long rigid wheel base, 7 ft. or 8 ft., between centres of wheels, before learning that it is a decided disadvantage and causes great discomfort to the passengers. The North Chicago Street Railway recently had a lot of new cars built in St. Louis. The wheel base is about 7 ft.; the overhang at the ends is about equal to the wheel base, and the way in which a passenger bobs around on these cars is enough to make an old sailor grumble. The path described in space, as shown by a geometrical drawing, is a curiosity. Not only does a passenger go bobbing up and down, particularly if he is on the end of the platform, but on curves he makes the most emphatic lunges to the right and left. These cars are so uncomfortable that it is difficult for passengers to stand, and there is no safety without clinging to a strap. As might be supposed, such heavy bodies as street cars loaded with passengers cannot be turned from a straight path without offering considerable resistance, and that which turns them into a curved from a straight path must necessarily be worn. So it is with the rails; on the curves they are worn in the most curious way. When the car first strikes a curve the wheels gouge out a piece of rail, and again when the car starts on the tangent, beyond, another piece is gouged out. The ordering of new equipment of this sort on a road carrying a large traffic can be attributed only to carelessness. Surely every street railroad manager must know that the comfort of passengers is a matter of business with him, but comfort is impossible on long cars with rigid wheel bases. The North Chicago Street Railway has a considerable number of double truck cars in use. These may cost more to maintain, on account of the greater number of axles and the swiveling trucks, but they are easier on the track and the passengers have no difficulty in standing on the platforms on any of the curves of the line. Some of the electric roads are equipped with these objectionable cars, notably that at Aurora, Ill.; but the majority of the best roads in the West have double truck cars. The best lines in St. Louis and Denver have some of excellent design. On these the trucks are near the ends of the cars, and they pass curves with a uniform circular motion. Only one thing can be said in favor of the rigid wheel base cars: They are light in proportion to their carrying capacity, and where the strength of the cable is deficient there may be some advantage in using them.

The disturbance created in trans-continental traffic by the sudden activity of the sailing ships which are taking such large quantities of freight around Cape Horn is affecting a good many interests. The Pacific Mail Steamship Company is the latest to feel the pressure of the

competition, and, this with other complications, has affected its stock in the New York market. The Trans-continental Association, at its meeting in New York last week, voted to continue until Dec. 1, the present agreement for paying a subsidy to the Pacific Mail. The contents in the Association regarding the rightfulness of this subsidy and its amount are exceedingly sharp. Some of the members, especially the Northern Pacific, which is least injured by the competition of the steamship lines, feel that they are paying too large a price for peace; but it seems that all are afraid to precipitate a break, and so it is finally decided every three months to stay in the frying pan rather than jump into the fire. The Southern Pacific controls such a large share of the freight from New York to San Francisco by means of its steamships between New York and New Orleans that practically all the roads in the Association, except the Southern Pacific, doubtless feel the subsidy to be a great burden. The special trouble under which the Pacific Mail is now laboring is a difficulty with the Panama railroad. The road receives a portion of the subsidy that the steamship line gets from the trans-continental railroads, and it is now sought to reduce this payment. The Panama railroad, of course, objects. The contract between the road and the steamship line expires on Feb. 1, next. The ownership of these two corporations was formerly nearly identical, but the road is now controlled by the Panama Canal, or rather by its receiver. The Canadian Pacific is just now accused of desiring to break away and reduce rates, but the reports are no different from those which have appeared periodically before. Meanwhile, the San Francisco merchants who have put the Cape Horn steamships up to this competition are congratulating themselves on the injury they are doing to the railroads, and making threats that they will do still more.

The Chicago people are going to have what they call a "shovel day" to-morrow (Sept. 3) the occasion of turning the first sod for their main drainage canal—a canal which will undoubtedly issue in a greatly improved waterway between Chicago and the Mississippi at St. Louis, though it is not certain that 14 ft. of water will be secured as Mr. Cooley hopes. The celebration, for which 500 invitations have been sent out, will require a special train of cars on the Atchison, Topeka & Santa Fe, which will carry the guests to a place on the line between Cook and Will counties, about two miles below Lemont, where the heaviest work is situated. Here President Wenter of the Drainage Commission will first make a speech and then will turn the first shovelful of earth. Mr. Cooley will give a history of the sanitary district, after which a blast will be fired in the rock. Mr. Eckhart will speak and then probably Governor Fifer, Mayor Washburne, and others will respond. Luncheon will be served on the train while returning to the city. Among the expected guests on the occasion are: Governor Fifer and his staff, members of the legislature and Congress, Mayor Washburne and his staff, the officials of the county, the aldermen of the city, the representatives of the newspapers and commercial organizations, Federal officers, and those who have been most interested in the drainage problem. In its condemnation suits for the right of way the Drainage Board has made remarkable progress. The first petitions were filed April 27. From Willow Springs to Joliet there are 3,000 acres involved, and all of this but 500 acres has been secured already. The suits in Du Page county were ended on the 27th at Wheaton by the return of a verdict in the suit of the Sanitary District against Tedens *et al.* of from \$25 to \$100 an acre for 200 acres of land. The verdict is considered a great victory. There were 14 owners interested, and some of them held out for a price of \$2,000 per acre for some of the land, on the ground that it was valuable stone land. There is a prospect that the balance of the land will be in possession of the Board by Sept. 1.

The Buffalo strike did not seriously affect the Buffalo, Rochester & Pittsburgh, and the Western New York & Pennsylvania roads until the middle of last week, but when it did affect them the bituminous coal traffic was seriously disturbed; and one of the curious facts stated in the press reports was that the operation of the car service (demurrage) rules "had been such as to force the keeping of only a small supply of coal on hand." This is one indication of a fact which is apparent in many places, that consignees will readjust their business in all sorts of ways rather than provide themselves with the necessary storehouses. The chief, and in fact the only aim of the railroads in charging for the use of their cars was to put a stop to the use of rolling vehicles as stationary store houses, but it is evident that this desirable result is to be brought about only after a slow process of education. Instead of driving the curbstone merchants to adopt the more businesslike methods of the old established concerns, the effect seems to be to drive the latter to the methods of the former. It is to be regretted that the rates for the use of cars cannot be fixed more nearly at the true value of the cars to the railroad company. At present there are many cases where it is actually cheaper for a consignee to pay some demurrage rather than build a storehouse.

A New York paper reports that an express passenger train on the Long Island railroad broke apart three times

during a short journey one day recently. The train was running at 50 miles an hour when the coupling parted behind the baggage car, and, according to the veracious reporter, the locomotive ran more than a mile before the engineman could get it under control. When finally the rear part came up, the engineer had to move forward in a lively manner to avoid a collision. The train was recoupled, but after it had parted twice more, it was found that the baggage car drawbar was defective. It would seem that the Long Island road still uses non-automatic brakes, in which case it will perhaps work no injustice if the reporters give sufficiently free rein to their fancy, on an occasion like this, to scare those of their readers who ride on the road so that they will demand safer apparatus. They ought to post themselves on details just a trifle, however; enough to put the blame more nearly where it belongs. It is rather too bad that the wide-awake engineer who took care to keep his engine in motion for a mile so as to avoid a collision, should be charged with inability to manage his steed.

NEW PUBLICATIONS.

Electric Lighting Specifications, for the use of engineers and architects. By E. A. Merrill.—New York: The W. J. Johnston Co., Limited, 1892.

These specifications are accompanied by a very brief introduction and an index, also by the *Rules of the National Electric Light Association*, as amended at Buffalo, Feb. 23, 1892; by the *Rules of the National Board of Fire Underwriters*, adopted Jan. 15, 1890; and by the *Rules and Requirements of the New England Insurance Exchange for Electric Lighting*, adopted Sept. 27, 1890. It will doubtless be convenient for many persons to have these rules bound together in handy shape on the shelves of the reference library; but the specifications would be more convenient if printed in the usual form, with proper blank spaces, ready for filling up and attaching to a contract. As a memorandum of the numerous items to be provided, and provided for, in electric lighting, this example of a Specification will be very suggestive to those who have had only a little experience in making contracts; and it would be a useful exercise for a student in electrical engineering to complete one of these skeleton outlines by inserting all the necessary details and dimensions.

The use of steam is so general in electric lighting that the author has given specifications for a complete steam plant, of a very general character however, yet sufficiently in detail as to the requirements which must be fulfilled to make the bids of several manufacturers comparable. Inasmuch as water power is coming now so extensively into use for the production of electric energy, the author would have rendered a valuable service by adding to his specifications those required for a water-power installation; yet let us be thankful that he has contributed to our assistance so much as this book already contains.

Inland Navigation.

At the Fifth International Congress on Inland Navigation, held lately in Paris, an interesting paper was read by Mr. Edward P. North, of New York, entitled "Notes on the Relations Between Railroads and Waterways in the United States." Some of the calculations and statistics included in this essay will be of value to our readers. Thus, the water-borne traffic of the Northern lakes during the season of 1890 is reported by the census at 30,299,000 tons, carried an average distance of 566 miles, giving a total ton miles of 17,148,237,385, or almost one quarter of the ton miles reported by Poor's Manual for all the railroads of the United States for the same period.

From various sources Mr. North is able to compute the total water-borne commerce of the country as fully 25,000,000,000 ton miles, which added to 80,000,000,000 of railroad freight, makes an aggregate distribution amounting to 1,500 ton miles per capita. Mr. North then argues that the people of this country pay less per ton mile for assembling and distributing their products than any other, largely because most of our canals and waterways are free from tolls.

This paper shows clearly that the waterways and railroads, while antagonistic and in competition with each other, have, on the whole, been mutually helpful. For example, the value of the freight transported on the Northern lakes in 1890 is \$342,522,290 and the cost of its transportation 1 1/2 mills per ton mile, or 6 1/2 per cent. of its value. If this freight had been transported at railroad rates the charges would have been 46 per cent. of their value, which would have made the production of the materials transported unprofitable. The railroads carry the express freights into which these heavy goods are converted and the passengers who are employed in the manufacture of the heavy freights.

After showing that the freight rate by railroad in 1890 was only 23.45 per cent. of the rate of 25 years previous, Mr. North shows also, by an examination of the accounts of seven trunk lines at the two dates, that this reduction has not been disastrous to investors in our railroad stocks, but that they are earning about the same rate per cent. upon their increased capitalization that they did in 1865, and that the average market value of the seven stocks in July, 1865, and in July, 1890, did not vary one-half of one per cent. from par.

Tables and profiles conclude this able paper, which exhibit the relations of volume of traffic and its growth to the fall in rates of transportation and to the addition

of facilities. A comparison is made between our St. Mary's Falls Canal and the Suez Canal, which indicates that the improvement of each has been at once followed by a large increase in the tonnage transported. It appears from this profile that the tonnage, which passed through the St. Mary's Falls Canal in 1890 exceeded that of the Suez, but was overtaken and a little exceeded by this last in 1891.

Notes on British Train Speeds.

III.

THE MIDLAND.

Generalities on Train Services.—The Midland is one of the largest English systems, and forms one of the three great competing routes from London to the North. Its main line extends from London to Carlisle via Leicester, Sheffield and Leeds. From this a loop line branches off at Kettering for Nottingham, returning again to the main track north of Trent Junction. At the same junction an important offshoot leads to Manchester and Liverpool via Derby, and from Derby a line runs southwest to Birmingham and Bristol, placing these two important towns in direct communication with the north, northeast and northwest of England.

The services on the Midland are nearly everywhere good, as may be seen from the table we give below, showing the services from London to the principal points. The large towns have also good services, as a rule, as between themselves, most of them being situated on the main line, thus enabling the through expresses to stop there for a few minutes on their way north.

SERVICES FROM AND TO LONDON.

Between London and—	Miles.	No. of trains per hour.		Postcal.	Other particulars.
		Down.	Up.		
Bedford.....	49 1/2	7.	9.	h. m.	
Leicester.....	99	12.	12.	1 55	
Nottingham.....	124	12.	8.	2 25	
Sheffield.....	164 1/2	10.	8.	3 25	
Leeds.....	106	9.	8.	4 5	Most trains run via Nottingham and Sheffield (204 miles); via Nottingham is 202 1/2. Via Sheffield 197 1/2 miles. The distance in table (196) is by route taken by fastest trains, as in the case of towns below.
Bradford.....	200 1/2	7.	7.	4 30	Distances vary as in the case of Leeds.
Carlisle.....	307 1/2	5.	5.	6 41	Distances vary as in the case of Leeds.
Derby.....	120 1/2	8.	7.	2 40	The fastest trains run via Chaddesden (191 1/2 miles), but nearly all go via Derby station (192 miles); one, the best, though not the fastest, goes to Manchester via Nottingham & Chaddesden (202 1/2 miles) in 4 h. 20 min., and to Liverpool in 5 1/2 hours.
Manchester.....	191 1/2	8.	6.	4 15	
Liverpool.....	220 1/2	6.	5.	5 0	

Although the Midland has not nearly so many instances of booked speeds at over 50 miles an hour as its rival, the Great Northern, still on the southern section of its system there are several expresses which attain or exceed this average. The trains are certainly nearly always light, but the gradients are somewhat severe. With the heavier trains about 48 miles an hour is booked speed. Some of the best examples of high speed on the Southern section of the Midland are the runs of the up and down Scotch expresses between London and Leicester (90 miles) in 115 minutes; London to Bedford, by the day Edinburgh express (49 1/2 miles) in 57 minutes, and the various up and down Leeds expresses between Kettering and Kettering (70 1/2 miles) in 81 minutes, and between Kettering and Nottingham (51 1/2 miles) in the hour.

Further north, between Leicester and Leeds, where the line is rather more level, the speed is somewhat disappointing, rarely exceeding 48 miles an hour. Over the Settle & Carlisle line, however, 46 to 48 miles an hour is very frequent, in spite of the very difficult gradients to be overcome (details below). The trains here are also heavier, but assistant engines are often employed on the long grades.

Between Derby and Manchester another very difficult piece (long gradients of 1 in 90) the speed is rather disappointing and rarely rises above 45 miles an hour. Elsewhere on the system the speed is generally good, but nothing remarkable. Punctuality is throughout fairly good, but in summer it is very frequently absent all over the system.

Locomotives and Train Loads.—The passenger locomotives on the Midland Railway were, until recently, all

*For previous articles see *Railroad Gazette*, Aug. 12, p. 599 and Aug. 19, p. 611.

Name of class.	Diameter of driving wheels.	Cylinders.	Heating surface.	Boiler pressure.	Grate area available for adhesion.	Weight in working order.	Weight of tender loaded.
	ft. ins.	Inches.	Sq. ft. Tubes. Sq. ft. Box.	Lbs. per sq. in.	Sq. ft.	Tons. Cwts.	Tons. Cwts.
1,863 "singles".....	7 6	18½ × 26	1,153.6	117	19.08	17 10	43 1
1,808 "coupled".....	6 6	18 × 26	1,151.0	110 16	17.67	27 5	41 9
1,754 "coupled".....	7 0	18 × 26	1,151.0	110 16	17.67	28 3	42 15
1,669 "coupled".....	7 0	19 × 26	1,011.46	110 16	17.5	27 10	42 10

of the four coupled type. During the last year or so, however, Mr. Johnson, the Locomotive Superintendent of the line, has been building a number of single driving engines, the dimensions of which, together with those of the more recent coupled classes, we give in the accompanying double-column table.

Train loads on the system are briefly referred to above. As a general rule, the very fastest trains rarely load to more than 120 tons (exclusive of engine and tender), while the slower expresses are often much heavier. Assistant engines are, however, generally used if the load gets above 170 or 180 tons.

Actual Performances with Particulars of Gradients.
—We present below, in tabular form, particulars of some excellent records recently performed by Midland locomotives on the hillier sections of the company's system.

Stations.	Miles.	Time due.	Time actual.	Speed in miles per hour.	Particulars of gradients.
St. Pancras.....		a. m. 10.30	h. m. s. 10 30 50		
Camden Road.....	1¼		10 33 25	29.	About ¼ mile of 1 in 90; the rest easy.
Kentish Town.....	1¼		10 33 50	33.	
Haverstock Hill.....	2¼		10 36 11	41.	Easy ascent, varying in difficulty.
Finchley Road.....	2¼		10 37 11	38.	
West End.....	4		10 38 48	46.	
Child's Hill.....	5¼		10 40 48	52.	
Hendon.....	7		10 43 32	55.	
Mill Hill.....	9¼		10 47 23	47.	
Elstree.....	12¼				
St. Albans.....	20		10 54 37	63.	Rises at 1 in 167, falls 2¼ miles at 1 in 200, and then rises the rest at 1 in 180.
Harpenden.....	24¼		10 59 53	54.	Rises 1¼ miles at 1 in 180, and then has steep ups and downs.
Chiltern Green.....	27¼		11 2 21	61.	Steep short rises and falls (1 in 180, 1 in 200, etc.).
Luton.....	30¼		11 5 8	65.	Descends into Bedford at an average of 1 in 250.
Leagrave.....	32¼		11 7 40	59.	the grade varying from 1 in 180 easier.
Harlington.....	37¼		11 12 3	61.	
Flitwick.....	40¼		11 14 32	72.	
Amphill.....	41¼		11 15 53	67.	
Bedford.....	49¼	11.27	11 23 4	67.	

The first few miles of this company's main line lie through two or three large goods and mineral yards and sidings. These necessitate careful running, and explain the differences in speed as stated in the table above for the first four or five miles out of London.

Stations.	Miles.	Time due.	Time actual.	Speed in miles per hour.	Particulars of gradients.
Hellfield.....		a. m. 3 48	a. m. 3 15 20		
Settle.....	5¼		3 21 44	49.	Descends chiefly at 1 in 180, followed by short piece at 1 in 100.
Horton.....	11¼		3 31 45	36.	Rises at 1 in 100, followed by the last two or three miles being steep ups and downs.
Ribbleshead.....	15¼		3 40 41	30.	
Dent.....	21¼		3 49 47	49.	Rises and falls at about 1 in 200 (grades varying greatly), followed by descent at 1 in 160.
Hawes.....	25¼		3 53 14	61.	
Kirby Stephen.....	35		4 3 36	50.	Descends at 1 in 100.
Crosby Garrett.....	38¼		4 7 2	57.	
Ormside.....	43¼		4 12 8	59.	
Appleby.....	49¼		4 14 48	67.	Rises at 1 in 183.
Long Marton.....	48¼		4 17 54	47.	
New Rigg.....	51¼		4 21 5	56.	
Culgaith.....	53¼		4 22 20	67.	Gradual descent.
Langwathby.....	50¼		4 25 57	60.	
Little Salkeld.....	5¼		4 27 23	65.	
Lazonby.....	61		4 30 13	58.	Rises and falls at 1 in 176.
Armathwaite.....	66¼		4 36 42	51.	
Cotehill.....	69¼		4 40 24	53.	Descends at 1 in 132.
Cumwhinton.....	72¼		4 43 12	59.	
Scoby.....	75¼		4 44 23	69.	
Carlisle.....	76¼	4 30	4 49 8	35.	Undulating.

Some Moral Factors in the Engineer's Career.*

It were easier to discuss with you some weighty technical question, or the general aims which distinguish our profession, but I consider a homelier topic of more timely importance. What we are all after is success. Each engineer, were his ambitions realized, would be the foremost in rank, do great things, gain fame, position, power and possibly wealth. I say possibly wealth; for, gentlemen, you may as well understand clearly at the outset that the financial return of the engineer's work is as a rule not large. A given amount of energy and ability meets less money award at the present time in engineering than in the professions of law and medicine. Despite the rigid teaching of political economy to the contrary, expressed in the laws of demand and supply, I have been inclined to believe that the fault lies to some extent at least with the engineers themselves, inasmuch as they do not raise the standard of fees and compensation along the whole line. But, whatever the cause, the fact is as stated, and one to be deplored. Remember, however, that the very best way to defeat the ultimate securing of proper financial return is for young men to practice the profession with that aim solely, or, even mainly, in view. And this brings me to my first point of advice: Whatever you undertake in the beginning, for a few years at least, let the money consideration be of slight import. Accept such positions as give you an opportunity for acquiring further knowledge, for gaining the right kind of experience and judgment—positions in which you have an opportunity to wipe out the special deficiencies you individually possess, and which deficiencies you yourselves best appreciate. After a few years the indecision and lack of self-confidence, which prove such barriers in the beginning, will have vanished, and you will be in position to judge which specialty to follow. But, in the meantime, be not discouraged by rebuffs. European travel will be a more profitable investment three years hence than now.

After the preparatory work outlined, adopt and follow a specialty. The field of the engineer is so large that it is hopeless to till satisfactorily more than a small meadow and it is only by concentration of effort in a special department that the flower of success is within reach. Be self-respecting, but modest. Each man, in his soul, best knows the real worth of his achievement. But the conceited man will not be the successful man. Conceit kills progress. A good way to prevent an over-estimation of our work is to ask ourselves, What does it represent when compared with the life-work of Coulomb, of Weisbach, of Rankine, of Holley, and of the many other bright stars of the engineering firmament? And if perchance Rankine does not put our achievement to the blush, then let us weigh it in the scale of the world's work in engineering as a whole.

Be honest! Does the suggestion seem an insult? Carefully trained as you have been, surely every thought and impulse removes you from doing aught but what is honorable. But the temptations in the practical pursuit of our profession are great, and many engineers, and among them, I fear, graduates of technical schools, who at this hour of their life stood as unswayed as you, have fallen. Therefore, my caution. The tempter is so ingenious, so insidious. He crops up at every step, often in clear and almost complete disguise. Let me give you one illustration only, where hundreds are at hand. We are engaged by a client to write a specification and make plans on which general contractors will bid, and we are to superintend the work. Many machines must be specified. They have a staple market value, and whether we specify some devices or others, all equally good, and of the same cost, the work will not be affected either in value or in price, as far as the competing bidders or the client's purse are concerned. Along comes the salesman and offers us a commission, a bribe, if we will specify his devices. We remonstrate, are indignant, and order him out. He argues that his goods are sold for a standard price to the competing contractors, and that if we do not accept the commission he is simply so much in pocket. Or, we see nothing of him until after the contract is awarded. We have specified his machines because they are the best or most suitable, and after the award he calls on us and urges us to accept a fee in recognition of our having specified his goods. Or, the general contractor, after award or completion of contract, desires to pay us a commission, or a percentage of his profits. Every attempt is made to prove that our client gains nothing by our refusal, that we are fools not to accept the commission, and the monetary returns seem large and easy of attainment. Do not be deceived by the tricks of these philanthropists, who are so anxious to get rid of their money. Advise them to spend it on public charities instead. Drop them a hint that you well know their game. They wish you to see their machines and their work, if not on this special contract, then on the next, through the refracting medium of the dollar bill, obscuring your vision and biasing your judgment. Let your conscience not falter for a single moment. I may take an extreme view, but it is my firm belief, and I consider it a privilege to say it here on this occasion publicly, that the engineer who receives a commission in this way is a thief, unknown to his client and the law, but to his own knowledge a convicted criminal in the power and under the final and absolute command of the party who has purchased him. To the engineer who does not practice his profession with unwavering integrity, success is impossible. It may seem for a short time to be at his door, but it will soon vanish. Aye! Were engineering success thus attained, believe me, it were but a curse.

Do all in your power to gain wide culture and foster broad interests outside of the engineering profession itself. In the past the general standing of the engineer and his work have suffered somewhat because his interests have been centred too exclusively on his professional labors. Be good citizens! Take an active interest in movements which tend to humanitarian, social and political advance, for this is a duty which, both as men and engineers, you owe mankind and the state. Were this participation more general, I doubt not, all public

* An address to the class of 1892 delivered by Alfred R. Wolff, M. E., at the commencement exercises of the Stevens Institute of Technology, June 23, 1892.

administrative offices, involving large engineering interests, would have as their heads, engineers, instead of, as is now the rule, politicians, in the restricted sense of the term, who harass and weaken the work of their engineering subordinates. * * *

TECHNICAL.

Manufacturing and Business.

The Carpenter Enamel Rheostat Co. now has its works at Bridgeport, Conn., in full operation. Although the works have only been in operation a short time, orders have already been received from over 50 concerns, one order alone being for 1,000 rheostats. The capital stock of the company is \$100,000 fully paid. The officers are H. Ward Leonard, President; Geo. H. Finn, Vice-President; Charles E. Carpenter, Secretary and Treasurer.

The cupola and charging room of the Griffin Wheel Co.'s Works, in Chicago, were burned about two weeks ago. The actual loss was about \$25,000. The charging room was a building 60 × 200 ft., two stories high. A new building will be erected at once. The new charging room will have on the first floor the separators, cylinder machines, core rooms and ovens, narrow gauge tracks, elevators and cupolas. The elevators will lift the narrow gauge dump cars from the first floor to the second or charging floor. The cupolas will be charged directly from the cars. The new building is to be generally the same as the one destroyed by fire, few changes being made. The company expects to be ready to resume operations this week.

The Washburn & Moen Manufacturing Co., of Worcester, Mass., has prepared plans for a large new mill building at the Quinsigamond Works for the manufacture of all kinds of wire springs. Between 200 to 300 hands will be employed in this department and new machinery has already been ordered.

The new frog switch works, located at Gettysburg Junction, Pa., are well under way and are to be ready for the machinery this week.

The Powell Planer Co., of Worcester, Mass., has orders for machinery for the Pennsylvania Steel Co., Steelton; the Carlisle Manufacturing Co., Carlisle, Pa.; and three large planers for R. Hoe & Co., New York City.

The Western Fence Co., Rookery Building, Chicago, is constructing galvanized wire fences for the following roads: Chicago, Rock Island & Pacific, on its southern extension now building into Texas; Missouri, Kansas & Eastern, on the line into St. Louis; 250 miles of fence wire, and on the Burlington, Cedar Rapids & Northern, 200 miles of fence wire. All of this work is to be completed within the present year.

The creosoting works of the Houston & Texas Central at Houston, Tex., are being worked to their full capacity, and present orders will keep them busy until the end of the year.

The Drexel and Janney couplers are to be used on the 400 coal and box cars recently let by the Illinois Central.

The Slocum Engineering & Construction Co. of Chicago has been organized with a capital stock of \$100,000 by T. S. Causser, L. Dumas and H. Bauerdorf.

New Stations and Shops.

The Berlin Iron Bridge Co., is putting up two iron buildings for the Randolph & Clowes Co., at Waterbury, Conn.—one a casting shop 42 × 82 ft. long and another a pickle room 25 × 100 ft. long. The Berlin company is also building a new gas house for the Philadelphia & Reading at Philadelphia, a new retort house for the Geo. H. Morrill Co., of Boston, and a new boiler house for the Pope Manufacturing Co., at Hartford. All of these buildings are to be of iron after the plans of the Berlin company.

The contract has been let for the new Wabash freight house at Franklin avenue and the Levee, St. Louis, which is to cost \$100,000. The building will have a frontage on the Levee of 828 ft., extending back to Commercial street 72 ft. The structure will be in two sections; the south section will be 328 ft., long and two stories high; the north section will be one story high and 150 ft. in length. The building will be equipped with several large hydraulic elevators for raising freight from one story to another. Offices will be located on the second floor.

The new Baltimore & Ohio round house at Benwood Junction, W. Va., is rapidly approaching completion. Work will begin at once on the other large building.

The Grand Trunk will erect a new station at St. Hyacinthe, Que., this fall. The Canadian Pacific is to erect a large station at the new town of Estevan, Man., the junction of the Souris branch and the "Soo" extension.

The Michigan Central offers to build a new station in Amherstburg, Ont., at a cost of \$14,000, to take the place of the structure recently burned, if the town will pay half the cost.

The Altoona, Clearfield & Northern proposes to erect at Altoona, Pa., a stone building, to be used as a station, baggage and freight room, and for general offices of the company.

The Great Northern has built a station 20 × 68 ft. at Burlington, Wash., which it will use jointly with the Seattle & Northern.

Sub-contracts for work on the head house of the Reading Terminal station at Twelfth and Market streets,

Philadelphia, have been awarded to David A. Woelpper for woodwork, and to William Boyd for plastering. The contracts amount to about \$25,000 and \$65,000 respectively.

The new machine shops of the Elgin, Joliet & Eastern, at Joliet, Ill., though only under contract two months, will soon be completed. They adjoin the old round-houses and repair shop, and cover an acre of ground. The machine shop is 100 x 160 ft. and the new blacksmith shop is 56 x 54 ft. The cost of the new buildings is given at \$40,000.

Work is to be resumed without further delay on the new passenger station at Portland, Or., to be built by the Terminal Co., and the architects, Van Brunt & Howe of Kansas City, will award the contracts immediately for the foundations. The work on the station was suspended nearly two years ago on account of the Union Pacific difficulties. The plans have been modified to provide for a less costly building, but the general arrangement of the station will be unchanged, but the proposed trainshed will not be built at the present time. The tower and main entrance will be at the northeast corner of Sixth and Johnson streets, Portland. The station is to be of brick and stone, three stories in height and 500 ft. long with an annex.

The Chicago & Northwestern will build a passenger station at New Ulm, Minn. It will be a handsome brick structure and trimmed with cut stone, and will cost about \$20,000.

The Illinois Central has secured building permits for its new buildings at Burnside, south of Chicago. The plans provide for a two-story machine shop and power house at 95th street, to cost about \$50,000, and an eight-stall round house, to cost \$60,000. The company has prepared plans for a three-story freight house on Galienne street, New Orleans, to be 65 x 320 ft. long, with several steam elevators. A grain storage warehouse is to be built at Southport, near the city.

The Fitchburg is building a new station at Marlborough, Mass., similar to the one recently built at Waverly.

The Pennsylvania is building a new brick passenger station at North Pemberton, N. J., costing \$6,000, and plans have been prepared for a new station at South Pemberton to cost \$3,000. A new station at West Moorestown, 20 x 60 ft., costing about \$6,000, is nearly completed.

Iron and Steel.

Charles B. Thurston has been appointed Receiver of the Virginia, Tennessee & Carolina Steel & Iron Co., which is incorporated under the laws of New Jersey. It was organized to work coal and iron mines in the South, and owns considerable land at Bristol, Tenn.

The controlling interests of the Colorado Coal & Iron and Colorado Fuel companies have agreed upon a plan of consolidation which will soon be submitted to the stockholders. It is proposed that the consolidated company have \$6,000,000 of authorized bonds, \$4,244,000 to refund the bonds of the old companies, leaving \$1,756,000 in the treasury. The capital stock will consist of \$2,000,000 preferred and \$11,000,000 of common stock. The preferred will be issued to the Colorado Fuel Co.'s stockholders. Of the common, \$9,250,000 will go to the stockholders of the old companies.

Canal Projects.

The internal waterway scheme whereby there is to be an interior system extending from Massachusetts Bay to Florida is being seriously considered. The first step will probably be the simultaneous enlargement of the Chesapeake & Delaware and the Delaware & Raritan canals. The Senate has already voted an appropriation of \$25,000 for surveys of the Delaware & Raritan, and it is probable that the appropriation will pass the House in the next session. The present Chesapeake & Delaware canal has three locks each 24 ft. wide 224 feet long, the canal itself being 13½ miles long. It is proposed to lower the surface of the canal so that only two locks will be required, one at each end to make the tide water connections; to excavate until the canal is enlarged to a width of 130 ft. at the top and 50 ft. at the bottom with a mean depth of water of 27 ft. This will require a cutting of 43 ft. to be made from the present surface along the whole summit level for a distance of nine miles. The present estimate for the dredging is 10,061,729 cu. yds. and the total cost is placed at \$2,358,135. This will shorten the water route from Baltimore and Philadelphia from 422 to 112 miles, a saving of 310 miles each way. Naturally the figures of the promoters demonstrate that the investment will pay.

New Ships.

The Detroit & Cleveland Steam Navigation Co. is having two fine side wheel steamers built at Detroit for next season's business. Each will be 450 ft. long and finished in mahogany.

The North Pacific Coast road's new ferry steamer will be finished by April 1, 1893. The Cowles Engineering Co. has charge of the plans, and Fletcher, Harrison & Co., of Hoboken, N. J., will build the engines. The Fulton Iron Works, of San Francisco, will do the rest of the work.

The Detroit Dry Dock Co. has secured the contract for the construction of a large packet freight carrier for the New York Central Railroad. She will be a duplicate of the "Hudson" and "Harlem," which were both built by this company, except that she will be six inches wider and slightly longer.

New Shops of the Midvale Steel Co.

The Midvale Steel Co., Nicetown, Philadelphia, is at present making two additions to its plant, one being the shops in which the manufacture of heavy projectiles will be carried on and the other being a new machine shop. The former is nearly completed and will be operated shortly. The new machine shop, as at present being erected, will be 112 ft. wide, and ultimately extended to 600 ft. long by 76 ft. in height. Two Shaw electric cranes will be placed in this machine shop, one having a capacity of 80 tons and the other a capacity of 20 tons. These cranes will have 60 ft. span and 40 ft. hoist. All the machinery which it is contemplated to place into this new shop will be used for heavy gun work, for machining gun castings, the boring and finishing of shafts and other parts of marine engines, and for the finishing of projectiles to be used in 8-in., 10-in., 12-in. and 16-in. guns.

The building now under way is intended to accommodate the following machines: Six lathes of various sizes; one 12-in. gun boring lathe; one 100-in. ingot boring lathe; one 102-in. boring mill, to be used in machining hoops for 10 and 12-in. guns; one 54-in. slotter; one 96-in. planer; four 20-in. slotters; 10 lathes having from 14-in. to 30-in. swing, and 12 lathes for finishing projectiles.

The Nickel Armor Plate.

Regarding the reports that the unsuccessful trials of nickel plate have been hushed, Acting Secretary of the Navy Soley says: "There have been absolutely no unsuccessful trials of either nickel or Harvey plates. On the contrary, the uniform results of these trials have been a phenomenal success. No results in any degree approaching them have ever been attained at the tests of any foreign armor." The statement that the change from curved to straight plates means several hundred thousand dollars to the two contractors is also incorrect. The plates at the extreme end being of a peculiar shape cost \$600 a ton; the next, being also of a peculiar shape, cost \$525 a ton. The remainder cost \$500 a ton, or \$10 less than the straight plates of the monitors.

Improvements on the St. Paul & Duluth.

Extensive improvements are being made in the terminals of the St. Paul & Duluth at St. Paul, Minn., which, when completed, will greatly facilitate the company's business. Considerable property has been purchased adjoining the freight yard, which will be enlarged and remodeled. Another tract has been acquired at Claymont, at the top of the heavy grade out of St. Paul. On this and other land owned by the company a new yard is to be constructed with about nine miles of tracks. Cars will be transferred to this yard as soon as loaded, thus obviating the necessity of double heading heavy freight trains up the steep grade.

A new brick freight house will be included in the improvements. It will be 450 ft. long and 50 ft. wide; the first 50 ft. will be two stories in height. The estimated cost of the improvements is \$150,000.

Harvey Nickel Steel.

The recent trials of Harvey process nickel steel plates seem to have demonstrated that this steel stands beyond compare, superior to anything produced elsewhere in the world than at the Bethlehem Iron Works. The latest test consisted of firing against a plate 10½ in. thick, ¾ in. shells, each weighing 250 lbs. and propelled with a striking velocity of 1,700 ft. per second, giving an aggregate energy of 25,040 ft. tons. Three of the five shells broke into small fragments on the face of the plate, and, although the other two went through the Harvey crust, not one of the five got into the wood backing behind. The plate was only slightly cracked in the upper right-hand corner. The most severe trial to which any plate has ever been subjected, previous to the one just quoted, was a Harvey plate against which four 6-in. and one 8-in. projectiles were fired. And even this trial was acknowledged by the English expert, Capt. Orde-Browne, to be more severe than anything that had been attempted on the European side of the Atlantic.

Illinois Central Improvements in Chicago.

We have heretofore given some attention to the progress of the improvements, contemplated and actual, of the Illinois Central in and about Chicago. Among other improvements not before mentioned is the demolition of the old passenger station at the foot of Lake street. This is the old depot which has been an eyesore to the people of Chicago ever since the fire of 1871. It has been used by the Illinois Central and the Michigan Central since that time as their main passenger station. After the completion of the new station at Park Row, only suburban trains will run to and from the foot of Lake street. The Illinois Central will build a passenger station for the accommodation of this local traffic on the site of the old depot. The space now used by the Michigan Central and the Illinois Central roads as passenger yards, and part of the ground occupied by the old depot, will be devoted to freight service. The Michigan Central which comes into Chicago over the Illinois Central tracks has acquired considerable space in the district near the old depot, and it is used for freight yards and houses. Upon the removal of this old depot the arrangement of the freight yards will be materially altered. The Michigan Central has begun work on a big freight house which will extend 480 ft. north from South Water street, and will be 90 ft. wide. The building will be built of fire-proof material, and will be five stories high, without ornamentation, and have very few windows. Twenty-eight

cars can be unloaded at it at the same time, the lading as it is taken from the cars being carried to one of the five floors upon elevators, and distributed according to its character and its consignee. Freight likely to be called for immediately will be unloaded on the lower floors. A driveway will be built so that teams can enter the second story. The entrance to this driveway will be on Michigan Avenue.

The Canadian "Soo" Canal.

This canal is being constructed through St. Mary's Island, on the north side of the rapids of the River St. Mary, and, with that river, will give communication between Lakes Huron and Superior through Canadian territory. At ordinary stages of the river water there is a difference of 18 ft. in the levels of the water above and below this island. The length of the canal across the island is 3,500 ft. A considerable amount of excavation is required to form channels of approach both at the upper and at the lower entrances, and the total length of the canal and approaches will be about 18,140 ft. For contract purposes, the work was divided into three sections, and contracts for the lift-lock were let in November, 1888, and for other work in 1889. The scheme as covered by these contracts contemplated a lock designed to pass two vessels at one lockage. The plans were subsequently twice modified, and in December, 1891, the following dimensions were adopted. Length of chamber, 900 ft.; width of chamber, 60 ft.; gate width, 60 ft.; depth of water on the sills, 19 ft. at the lowest water level. This depth is intended to be the equivalent of the depth of the new American lock now under construction. By the scheme as so modified the lock will take three vessels lying one behind the other. The canal proper will have a width at the lower water level of 152 ft., and a bottom width of 145 ft. The depth at mean water level will be sufficient for vessels drawing 20 ft. The works, including both those for the lock and the canal, also the entrance channels at both ends, are in progress.

The Contract for the Cornell Dam.

The New York Aqueduct Commissioners awarded the contract last week for building the new dam at Cornell, Westchester County, N. Y., to James S. Coleman, at his bid of \$4,150,573. This was the second time bids were opened for this work. When the first proposals were opened several weeks ago it was found that the Ryan & McDonald Construction Co., of Baltimore, were the lowest bidders, at \$3,527,040. The engineer's estimate was \$4,574,201, and it was decided to reject the first series of bids. The bids under the re-advertisement were as follows: James A. Coleman, New York, \$4,150,573; H. H. Brown, \$4,181,464; T. J. Sullivan, of Albany, \$4,314,865; John McQuade, \$4,403,800; Winston, Crimmins, Washburne & Co., \$4,532,700. The members of the latter firm were F. G. Winston and Arthur McMullen, of Minneapolis, and Thomas E. Crimmins and F. S. Washburne, New York City. The new dam will be a combination of masonry and earthwork, and it will be built across the valley of the Croton River. It will be 1,300 ft. long, 680 ft. of which will be masonry. The spillway will be 1,000 ft. long. It will be about 160 ft. high at the highest portion of the masonry section, and the foundation will extend about 80 ft. below the river bed. The base of the dam will be 185 ft. thick in some places, and the crest will be 20 ft. thick. The outer face will have a slope of 2 vertical to 1½ horizontal.

A New Roller Bearing.

A new roller bearing has been brought out in St. Paul, Minn., and has been given a practical test on the East Seventh Street cable railroad of that city. The following, taken from a St. Paul paper, shows the results obtained from a test made with two loaded street cars, one being equipped with the roller bearing and the other with an ordinary bearing. The car with the roller bearing weighed 336 lbs. more than the other. Comparing the results of this test, it is seen that it takes to move a car equipped with roller bearings but 50 or 60 per cent. of the power necessary to move a car equipped with ordinary bearings. This bearing has been applied to an Edison dynamo, the armature of which makes 800 revolutions a minute. It has been in service for two months, and has shown no heating whatever. This bearing has also been placed on a shaft making 2,700 revolutions a minute. It is patented by Mr. Bruno Beaupre, of St. Paul.

	Ordinary car.	Car with roller bearings.
Weight, loaded, lbs.	2,903	10,351
Power required to start, lbs.	170	70
Power to maintain speed.	130	50
To start empty car.	80	70
To maintain speed of empty car.	40	29

The Mesaba Iron Mines.

A number of mines on Mesaba iron range in Minnesota, termed the Humphreys properties, have been leased to John R. Weimer who guarantees that the minimum annual output shall be 1,400,000 tons.

THE SCRAP HEAP.

Notes.

A railroad train has arrived in Jerusalem from Jaffa, the railroad between the two places having been completed.

There was a strike of switchmen on the New Orleans & Northeastern, in New Orleans, on Aug. 14, the grievance being that a brotherhood man was not appointed

yardmaster; and on the night of the 29th the bad feeling resulted in the shooting of four new workmen and one striker.

The pneumatic block signals recently erected on the Central of New Jersey were put in use this week. The trains are now run by automatic block signals all the way between Jersey City and Bound Brook, 31 miles. The power stations are located at Communipaw, Roselle and Greenbrook.

The stone bridge at Mantua Junction, West Philadelphia, by which the south bound trains of the New York division of the Pennsylvania and the west bound trains of the Philadelphia division across each other's tracks at different grades, has been completed, and the passenger tracks of the New York division, which go under the bridge, were put in regular use on Aug. 28. This improvement was described in the *Railroad Gazette* of Feb. 5 last.

On Saturday the bridge of the Minneapolis, St. Paul & Sault Ste. Marie over the Pomme De Terre River near Barrett, Minn., fell, carrying with it three cars of a passenger train. Six passengers were killed, and 11 seriously injured. Among the more seriously injured is John McMillan, Roadmaster and President of the Northwestern Track and Bridge Association. The bridge was a trestle. The cause of its failure has not been reported.

A press despatch of Aug. 26 reports the destruction of a large bridge on the Western New York & Pennsylvania at Sherman, N. Y., by a sudden freshet. Several highway bridges were also wrecked. It is said that the railroad bridge, which was of iron, was dislodged by the water, and that it dropped into the stream, a distance of 60 ft. A bridge on the Pittsburgh, Chenango & Lake Erie, at Dixonburg, Pa., gave way while an engine was passing over it on Aug. 23, causing the death of one employee.

The Colorado Midland has advanced the pay of its telegraph operators, making the minimum salary \$75 a month. The reports indicate that the arrangement is similar to that recently adopted on the Denver & Rio Grande. It is also reported that the Vandalia line has advanced the salaries of its telegraph operators, making the average about \$65 a month; the minimum rate is \$45 a month. The report that the Northern Pacific had increased the salaries of its telegraph operators is pronounced unfounded.

The Philadelphia & Reading has notified the employees of the Lehigh Valley, now controlled by the Reading, that the company desires them to join the Philadelphia & Reading Relief Department. Some of the newspaper accounts state that more or less compulsion is used to effect this object, some of the employees claiming that they have been ordered to withdraw from the beneficial brotherhoods with which they are now connected. The Lehigh Valley had some sort of a mutual benefit department of its own a few years ago, and we believe that it is still in operation, though not much is said about it.

Most of the militia left Buffalo on Aug. 25 and 26. The switchmen of the Delaware, Lackawanna & Western and the New York, Chicago & St. Louis who struck a second time returned to work on the 26th. The determination of a few strikers to continue the fight after Mr. Sweeney ordered it abandoned, amounted to nothing. There was considerable lawlessness in the night time for several days after the departure of the military. On Sunday the police and deputy sheriffs took full charge of the disturbed territory. On Monday of this week a New York paper reported that 60 of the new switchmen of the Buffalo Creek Road gave up their jobs, because they were so much annoyed by lawless persons. Five men were arrested for interfering with non-union brakemen.

Sir George Findlay, General Manager of the London & Northwestern, has lately compiled some figures showing the condition of British railroad employees and incidentally gives some figures regarding the recent growth and present immense proportions of the railroad corporations of England. The capital of all the railroads in England is \$1,000,000,000, and the annual receipts over \$400,000,000. Fifty four per cent. goes in working expenses, and over \$200,000,000 is paid out in wages. The number of men directly employed by the railroad companies of Great Britain and Ireland is upward of 350,000. Sir George cites several cases in which the condition of the men as regards wages and hours has been improved, but says that he objects on principle to dealing with representatives of trades unions, which might as well be established in her Majesty's army as in the railroad service.

The law passed by the Michigan Legislature of 1891 increasing the specific tax upon the earnings of railroad companies provided that in case the State authorities were not satisfied with the return of proportionate earnings in that State as a basis for taxation they could assess upon the actual earnings. The Milwaukee, Lake Shore & Western discovered that its actual (alleged) earnings in Michigan were only \$372,371, while its proportionate earnings amounted to \$533,868 and contended that it could also have an option and pay upon the smaller amount. After an extended hearing the Railroad Commissioners made a decision adverse to the road. The counsel declared his purpose of appealing to the courts, but at the end of two months delay, the amount of tax based upon the proportionate earnings was paid into the treasury.

Canadian Canal Traffic.

OTTAWA, Aug. 27.

The Dominion Minister of Railways and Canals has just prepared a long statement showing the quantity of freight passing through the St. Mary's Canal and the Welland Canal to Canadian ports from Duluth and Port Arthur during 1891, which, under President Harrison's proclamation, would be subject to tolls in passing through the "Soo." The estimate does not include freight destined to Canadian ports which would pass through the "Soo" but not through the Welland Canal, and therefore does not take account of a large quantity of east bound freight upon which Canadian shippers will have to pay toll. Estimated upon the basis of last season's traffic for the three months, September, October and November, the quantity of freight passing east through the "Soo" Canal and Welland Canal would be about 43,116 tons, representing, at 20 cents a ton, a total tax of \$8,623. The following statement shows the quantity of freight from Canadian and United States ports on Lake Superior which passed eastward through the "Soo" Canal and Welland Canal to Canadian ports during the season of 1891:

	From Canadian to Canadian ports.	From U. S. to Canadian ports.
May.....	3,755	13,389
June.....	11,795	11,641
July.....	7,508	3,924
August.....	1,838	1,638
September.....	1,178	15,012
October.....		15,021
November.....	7,888	9,017
Total.....	34,052	63,072

The total quantity was 97,124 tons, which, at 20c. per ton, would give \$19,425 for the season's shipments. The quantity for September, October and November is as follows: From Canadian ports to Canadian ports, 9,066 tons; tolls, \$1,813. From United States ports to Canadian ports, 33,050 tons; tolls, \$6,610, making a total for the three months of 42,116 tons, on which the toll at 20 cents would be \$8,423.

During 1891 sixty-four American vessels, aggregating 13,521 tons, and 62 Canadian vessels, aggregating 63,198 tons, cleared with cargo from Duluth for Canadian ports, while six American vessels and nine Canadian vessels cleared in ballast from Duluth for the same destinations. During the same period 63 American vessels, aggregating 12,796 tons, and 57 Canadian, aggregating 59,387 tons, with cargo, arrived at Duluth from Canadian ports, while 13 American vessels and 24 Canadian vessels arrived in ballast. This shows a total tonnage of 149,977 tons passing with cargo between Duluth and Canadian ports during 1891. During that year Canadian vessels carried 70,843 tons of freight to Port Arthur, while American vessels carried 28,309 tons. There cleared from Port Arthur 39,523 tons of freight in Canadian vessels and 67 tons in American vessels.

A Traction Engine in California.

The following is from the Stockton, Cal., *Independent*:

"Peter Chalmers, of Farmington, is hauling some very large loads of wheat into town. He owns a traction engine, which hauls 11 wagons loaded with grain, and delivers at the Stockton warehouse every second day from 700 to 800 bags of wheat. Mr. Chalmers has contracted to haul 30,000 bags of wheat to the warehouse, and his train will be kept moving until the grain is housed. The distance covered in a day is 20 miles."

The Panama Canal.

The latest move of the Panama Canal Co., to save what it can from the wreck, is a scheme for temporarily raising the value of stock, so that some of the shares may be foisted upon the credulous portion of the public. A committee headed by M. Hicliard, Vice-President of the Paris Chamber of Commerce, has been formed for the purpose of taking the concessions and assets of the Canal company, with the ostensible purpose of resuming the work of construction. The effect of this has been to raise the price of shares from 17 to 23, although these quotations do not seem to be sustained by bona fide sales. The Canal company's concession has so nearly expired that there would not be enough time to complete the work were funds available. An extension of time would not be granted by the Colombian government, as was clearly proved by its refusal to accede to such a request when urged by Lieutenant Wyse in 1890. Lieutenant Wyse has the confidence of the Colombians to a degree not enjoyed by any other person connected with the ill-fated canal, and where he failed it is certain that no one else could succeed.

Electric Street Railroad.

The directors of the Buffalo, Kenmore & Tonawanda Electric Railroad have awarded the contract for the construction of the electric railroad to the Field Engineering Co. of Buffalo. The cost of the road will be \$125,000.

Irrigating Canal.

A contract was awarded last week at Fort Collins Col., to Carlile & Weitbre, of Pueblo, Col., for the construction of a canal from the Laramie River to Chambers Lake in Wyoming. The canal is to be completed by May 1, next, and includes a tunnel, dam and flume, and will cost about \$75,000.

The Inter-Continental Road.

A Washington press dispatch gives the following account of the movements of the surveying parties on the intercontinental road. Captain Macomb, in charge of the second corps, reports from San Salvador that he has finished the survey of the line through Guatemala. The first corps, under Mr. W. F. Shunk, has reached Cartagena, having surveyed from Quito to that place. They have been ordered to San Jose, Costa Rica, to work south toward Panama. The third corps, under Mr. William F. Kelly, has returned to New York, having surveyed from Quito to Cuzco, Peru, where connections were made with other surveys already completed by private enterprise. The survey has thus been completed from Cartagena to Cuzco, a distance of about 2,000 miles.

The Guatemala Northern Railroad.

R. H. May, agent in Guatemala for Sylvanus Miller, of New York, who has the contract for building the Guatemala Northern road, spent some time in New Orleans recently arranging for construction material from this country and gave interesting information regarding the project. The road is to extend from Puerto Barrios to Guatemala City, the capital, where it will connect with the Guatemala Central and make a continuous line from ocean to ocean. The work is just being begun and it is desired to have a large force so as to push the line to completion. The present contract only covers 20 miles, starting from the coast, and will run through a country adapted to become one of the finest fruit sec-

tions in Central America. As soon as the first division is completed arrangements will doubtless be made to build the rest of the road, but the present intention is to carry on the work solely with native capital. The project is not a new one, for the contract for the road was originally given out in 1885, and the work begun by Shea, Cormick & Co., of Knoxville, Tenn., when the death of President Barrios, an uncle of the present President Barrios, suspended operations and postponed the enterprise. The entire road is to be 195 miles long.

Spice from Salt Lake.

A report of the contest between the Salt Lake Chamber of Commerce and the trans-Missouri railroads shows the following telegraphic correspondence between the interstate commission and the Chamber of Commerce.

(From the Commission.)

"Co-Operative Wagon and Machine Company and 31 others, apparently the principal business houses of Salt Lake, telegraph at the request of the Union Pacific to have the hearing of the suit at Washington. If granted it will in no way prejudice public interests. What does this mean?"

President Donnellan, of the Chamber of Commerce, replied:

"It means that the Union Pacific can get the merchants here, whom it subsidizes, to sign anything it wants. The great bulk of our business men are anxious for relief, and insist upon the trial of the cases here on the date already set. Our witnesses are here, and a change would prejudice the cases materially. The railroads, knowing their weakness, have determined that the cases shall never come to trial if they can prevent it. The proposed change to Washington means unnecessary expense and inconvenience."

The Innocent Hotel Clerk.

A very clever swindler is traveling around the country claiming to be W. V. O'Connell, traveling freight agent of the Louisville, New Orleans & Texas. He carries with him a number of annual passes, which he exhibits when asking for transportation. Having secured a trip pass from some railroad official, he forges that gentleman's signature to a check, and with a letter, likewise forged, finds it an easy matter to get the check cashed. He was in Minneapolis and St. Paul about a week ago and obtained a trip pass to Chicago from the office of Mr. Chandler. Some time after he appeared at one of the principal hotels in each of the two cities and both of them cashed \$100 checks bearing the forged signature of Mr. Chandler. The letter is as follows:

W. V. O'Connell, Esq., Trav. Frt. Agt. L. N. O. & T. Ry.—Dear Sir: Herewith find my check for \$100, in payment of your claim, which upon investigation I find to be correct. Yours very truly,

J. A. CHANDLER,

Genl. Agt. C. M. & St. P. Ry.

The swindler is described as fine looking, well dressed, well educated and fully posted on railroad matters and railroad men.

LOCOMOTIVE BUILDING.

The Kingston Locomotive Works, Kingston, Ont., have sold two engines to the Lake Erie & Detroit River road.

The Minneapolis, St. Paul & Sault Ste Marie has purchased eight moguls from the Duluth, South Shore & Atlantic.

The two compound consolidation engines recently ordered by the Minneapolis, St. Paul & Sault Ste. Marie from the Rhode Island Locomotive Works are described as follows: High-pressure cylinder, 20 x 24 in.; low pressure cylinder, 30 x 25 in.; boiler pressure, 180 lbs.; shell of boiler, diameter, 62 in.; boiler extended wagon top type; boiler tubes, 248, 2 in. diam., 13 ft. 8 in. long; firebox, radial stay, 108 in. long, 35 in. wide, 70½ in. deep in front, 60 in. deep in rear; side rods, hammered iron, forged solid; driving wheels, 50 in. diameter; weight on drivers in working order, 113,000 lbs.; weight on engine truck, 15,000 lbs.; weight on tender, 75,000 lbs.; bearings, Damascus bronze; Richardson balanced valves; driving axles and crank pins of Low Moor iron; tires of Midvale steel; engine truck wheels steel tired; injectors, two No. 9 Mack, lifting; lubricator, Detroit triple sight feed; Boyer speed recorder; brakes, Westinghouse on tender trucks, American on all driving wheels.

CAR BUILDING.

The Wilmington & Northern has let an order for 100 cars to the Laconia Car Co.

The West Virginia & Pittsburgh has contracted for 350 coal and lumber cars from the South Baltimore Car Works.

The Burton Stock Car Co. of Boston, gave out orders last week for building 1,000 cars for immediate delivery. Contracts for 300 cars were let to the Carlisle Manufacturing Co., of Carlisle, Pa.; for 300 cars to the Middletown Car Works, Middletown, Pa., and 100 cars to the Laconia Car Co., Laconia, N. H.

BRIDGE BUILDING.

Duluth, Minn.—The Board of Public Works has received from J. A. L. Waddell, Consulting Engineer of Kansas City, his plans for a double-revolving cantilever drawbridge over the ship canal which separates Minnesota Point from the main land, and the Board believes that these plans will meet all the objections of the government engineers. The estimated cost of the bridge is \$300,000. At the meeting of the City Council on Aug. 29 an opinion on the question of the right of the city of Duluth to construct the bridge, regardless of the failure of the National Government to grant permission, was filed by Davis, Kellogg & Severance, of St. Paul. United States Senator C. K. Davis is the senior member of this firm, and the opinion was prepared by him and was entirely favorable.

Brooklyn, N. Y.—Bids were received this week by the Supervisors of Kings and Queens counties for building a bridge across Newtown Creek at Meeker avenue, from the King Bridge Co., who bid \$96,000; the Berlin Bridge Co. bid \$90,000 and the Dean & Westbrook, New York, \$94,850. The award was made to the latter firm.

Durand, Wis.—Chief Engineer Edward Sargent, of the Green Bay, St. Paul & Minneapolis, and a party of engineers, have been at Durand for several days, locating the best place for bridging the Chippewa River.

Hartman, Mich.—A new iron bridge is soon to be built across Pipestone River at Hartman.

Kingston, Ont.—Application has been made to the Ontario government for permission to build a new bridge across the St. Lawrence River between Pitts Ferry and

Howe Island. Mr. Aylsworth, Inspector of Bridges, recently inspected the location and will report on the project.

London, Ont.—The matter of building a new bridge over the mill creek on the Wharfedale Road has been referred to the City Council. The bridge was reported by City Engineer Graydon to be in a very dangerous condition.

Louisville, Ky.—The Mayor has approved the issue of \$50,000 of bonds for the erection of the Kentucky Street Viaduct, as already reported, but the City Engineer writes that he will not be ready to receive bids for the work until about the last of the year.

McKeesport, Pa.—An effort will be made to erect still another bridge over the Monongahela River from McKeesport to Duquesne. W. C. Soles, S. M. Bowman, W. C. Cronmeyer, F. E. Schuck, E. J. Taylor and Burgess John W. Crawford, of Duquesne, are the projectors.

Minneapolis, Minn.—The County Commissioners of Hennepin County find that they have no authority to appropriate money for a bridge entirely within the limits of the city and this will temporarily delay the construction of the bridge across the tracks of the Chicago, Milwaukee & St. Paul and the Minneapolis & St. Louis at Lake street. The cost of the structure was to be paid by the city of Minneapolis, the county, St. Louis Park Association and the railroads. The bridge is to be 90 ft. in length and to carry roadway and sidewalks aggregating 36 ft. in width. When it is completed an electric railroad will be built to St. Louis Park, a suburb of Minneapolis.

Moncton, N. B.—The last span but one of the Moncton bridge has been placed in position and only one of the old spans remain. The old spans are removed from the piers by burning the top chord off and letting them drop into the river. It is expected that the bridge will be completed this month. The new bridge will be some 2 ft. higher in the centre than the old one. The spans are 20 ft. in depth, being about 6 ft. deeper than the old ones.

Montrose, Ont.—Mr. Wm. Brown, of Welland, is receiving tenders for the construction of a drawspan in the highway bridge across the Welland River at Montrose.

New York City.—Secretary Swan, of the New York & New Jersey Bridge Co., tells the press reporters that the new plans for the bridge and viaduct are rapidly approaching completion.

Philadelphia.—Work is being rapidly pushed on the new Walnut street bridge across the Schuylkill River. The span from the pier on the west bank to the first pier in the river is now completed. The three spans will be finished about Oct. 15, and the iron work on the bridge will be completed about Nov. 1.

Quebec.—Preparations are being made for building the new bridge across the Gatineau River near Gatineau Point. The work may be begun next month. The estimated cost is \$40,000, and it is expected it will be constructed of iron. Of this amount \$25,000 has been subscribed.

Squamish Valley, B. C.—The Government inspector has made the preliminary surveys for the bridge to be built across the east arm of the Squamish River.

Toronto, Ont.—The Department of Public Works at Ottawa, has approved the city's plans for the bridge over the Don River at Queen street. The City Surveyor is preparing plans for submission to the railroad committee of the Privy Council and to the railroad companies. A special meeting of the committee will be called and the necessary approval be granted and the apportionment of the cost between the three corporations made.

Wenatchee, Wash.—The Wenatchee River is to be bridged at Wenatchee by Okanogan and Kittitas counties, jointly. J. L. Bayley has been awarded the contract, to build a wagon bridge 360 ft. in length besides approaches, the price being \$2,800.

West Hartford, Conn.—The selectmen are to build an iron bridge this fall between Seymour's Corners and Thomson's Corners.

Whitcomb, Wash.—The contract to build bridges across the Nooksack River, at Nugent Ferry, Lynden and Everson has been let to the San Francisco Bridge Co. The cost of the three bridges aggregates nearly \$20,000.

Wood Island, Mass.—The Boston, Revere Beach & Lynn Railroad contemplates rebuilding the bridge near the Wood Island station, at a cost of from \$40,000 to \$50,000.

RAILROAD LAW—NOTES OF DECISIONS.

Injuries to Passengers, Employees and Strangers.

In New York, the plaintiff having taken an express train which did not stop at the station to which her ticket entitled her to travel, on arriving at a station beyond it, left the train, and, for the purpose of returning to her destination, attempted to board a local train, which had made its regular stop and passed onto a side track to await the passage of the express. While getting on the rear platform of the rear car of that train, no conductor or brakeman being in sight, she was thrown off by the starting of the train and injured. The Supreme Court holds the railroad not liable.¹

In Arkansas, a train on which the plaintiff was a passenger, riding in the last car but one, stopped between stations at night. While it remained standing, another train was heard approaching from the rear on the same track. The conductor ran back with his lantern to stop it, and a passenger in the same car with plaintiff, looking out of the window, hallooed, "Here comes another train running into us; we had better get out;" whereupon plaintiff and others rushed to the car door and leaped from the train, and plaintiff was injured by falling into a ditch. The approaching train was an engine and caboose, moving about 10 miles an hour, and was stopped within about 30 ft. of the passenger train. Had it been a train of loaded cars, a collision could not have been prevented. In the Supreme Court the railroad is held liable.²

In a case in the Supreme Court of the United States the plaintiff purchased of the defendant's ticket agent at Boston an unlimited ticket for Chicago, paying an extra compensation to stop over at Olean, the ticket agent telling him to speak to the conductor about it. The conductor punched the proper coupon between Binghamton and Salamanca, telling him it was sufficient to permit him to stop over at Olean. But on plain-

tiff's again resuming his ride to Chicago from Olean he was ejected for failing to pay his fare to Salamanca, or to present a proper stop-over check, which the rules of the company required a passenger intending to stop over to obtain from the conductor. The Court decides that plaintiff was justified in relying upon the representations of the ticket agent and of the conductor who punched his ticket as to what was required to entitle him to the stop-over privilege, and could recover for the ejection from the train, it not appearing that plaintiff had any notice or knowledge of the rule of the company requiring a stop-over check.³

In Texas the Supreme Court holds that a railroad laborer, riding on a hand-car with three others, who injures his hand while assisting the others in lifting the car off the track to get it out of the way of an approaching train, cannot recover on the ground that the railroad company failed to furnish a sufficient number of men to handle the car, if its weight and the number of men necessary to handle it were matters open and patent to common observation, since, in such a case, he assumed the risk as an incident in his employment.⁴

The Supreme Court of New York rules that a brakeman who sees the unequal height of the drawheads of an engine and a car which he is about to couple, and that the link furnished him to make the coupling is straight instead of S-shaped, assumes the responsibility in attempting to use the straight link to make the coupling.⁵

In the Court of Appeals of New York it is held that a brakeman riding on a switch engine and directing its movement toward cars to be coupled is guilty of negligence in jumping off and walking before it on an unballasted track while removing the coupling link and pin from the drawhead on the tender.⁶

The Supreme Court of Texas rules that a railroad employee working in a bridge gang is a fellow-servant with workmen in the transportation department, although they have no duties in common, and are under the direction of independent superintendents.⁷

In Iowa the Supreme Court holds that a custom of a railroad engineer to start his engine, after taking water, without warning to his fireman, whose duty it is to go under the tender and adjust the spout, does not apply if the fireman's position on the tender is rendered unusually perilous by the presence of coarse, slippery chunks of coal, or if the engine moved more suddenly than usual in such cases.⁸

In Virginia the plaintiff was injured while braking on defendant's road. Defendant's rules prohibited the uncoupling of cars except by the use of a stick, and plaintiff knew of such rules. The conductor told plaintiff to uncouple certain cars. While he was pulling the coupling pin with his hands, a brakeman, who was left by the conductor to do the signaling, signaled the engineer to reverse the engine, and plaintiff was thrown between the cars and injured. The uncoupling could not have been done with a stick. The Supreme Court of Appeals rules that, though plaintiff was negligent, the proximate cause of the injury was the negligent conduct of the brakeman in giving the signal.⁹

- ¹ Phillips v. Northern R. R. of N. J., 16 N. Y. (Supp.), 909.
² St. L. & S. F. R. Co. v. Murray, 18 S. W. Rep. 50.
³ N. Y., L. E. & W. v. Winters, Admr's, 12 S. Ct. 354.
⁴ St. Louis, A. & T. Ry. Co. v. Lemon, 18 S. W. Rep. 331.
⁵ Welch v. New York Cent. & H. R. Co., 17 N. Y. S. 312.
⁶ Pinnell v. D. L. & W. R. Co., 20 N. E. Rep. 825.
⁷ I. & G. N. R. Co. v. Ryan, 18 S. W. Rep. 57.
⁸ Knott v. Dubuque & S. C. R. Co., 31 N. W. Rep. 57.
⁹ R. & D. R. Co. v. Rudd, 14 S. E. Rep., 361.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Connecticut River, quarterly, 2 per cent., payable Oct. 1.

Illinois Central, semi-annual, 2½ per cent., payable Sept. 1.

West Jersey, semi-annual, 3½ per cent., payable Sept. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama Great Southern, annual, Birmingham, Ala., Oct. 5.

Chicago, Detroit & Canada Grand Trunk Junction, annual, Detroit, Sept. 28.

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.

Florida Central & Peninsular, special, Jacksonville, Fla., Sept. 15.

Illinois Central, annual, Chicago, Ill., Oct. 12, to consider an increase of stock from \$45,000,000 to \$50,000,000.

Iowa Central, annual, Chicago, Ill., Sept. 2.

Kingston & Pembroke, Kingston, Ont., Sept. 10, to authorize the issue of new 5 per cent. bonds.

Lake Erie & Western, annual, Peoria, Ill., Oct. 5.

Louisville, New Albany & Chicago, annual, Indianapolis, Ind., Sept. 21.

Louisville, New Orleans & Texas, special, New Orleans, La., Sept. 30, and annual, Oct. 3, to consider a consolidation with the Yazoo & Mississippi Valley.

New York, Ontario & Western, annual, New York City, Sept. 28.

Northern Pacific, annual, Mills Building, New York City, Oct. 20.

Richmond & West Point Terminal, special, Richmond, Va., Sept. 15, for the election of directors.

St. Louis Southern, annual, Pinckneyville, Ill., Sept. 6.

Toledo & Ohio Central, annual, Toledo, O., Sept. 5.

Toledo & Ohio Central, special, Toledo, O., Sept. 29, to consider the increase of the stock, the extension of the line and other matters.

Toledo, St. Louis & Kansas City, annual, Toledo, O., Sept. 14.

Wabash, annual, St. Louis, Mo., Sept. 13.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual meeting at Lookout Mountain Hotel, Chattanooga, Tenn., Oct. 18.

The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y. The next meeting will be Sept. 15.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 21 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 300, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 33 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

American Association of General Passenger and Ticket Agents.

The thirty-seventh semi-annual meeting of this Association will be held at Hotel Champlain, Bluff Point, Lake Champlain, at 11 o'clock a. m., Tuesday, Sept. 20. A. J. Smith, of Cleveland, General Passenger Agent of the Lake Shore & Michigan Southern, is Secretary of the Association.

American Street Railway Association.

The American Street Railway Association will have its annual convention at Cleveland, O., Oct. 19, 20 and 21.

Western Society of Engineers.

The annual summer outing of the Western Society of Engineers took place on Sept. 1. A special train was provided by the Baltimore & Ohio, and left the Grand Central Station, Chicago, arriving at the World's Fair Grounds at 11 a. m. The interval until lunch time was spent in inspecting the grounds and buildings. The train left at 3:45 p. m., making a stop at Blue Island, arriving in the city at 6:30 p. m.

PERSONAL.

—Mr. John Thomas, General Agent for the Cleveland terminals of the Pennsylvania lines, has tendered his resignation to enter other business.

—Mr. Richard Lord has resigned as General Freight Agent of the Fort Worth & Rio Grande to accept the position as Traffic Manager of a Philadelphia firm.

—Mr. E. L. Sargent, of El Paso, has been appointed General Freight Agent of the Texas & Pacific, vice Mr. E. H. Hinton, resigned. The appointment takes effect at once.

—Mr. John McMillan, President of the Northwestern Track and Bridge Association, died on Tuesday, from the injuries sustained in the bridge disaster at Barrett, Minn., on Aug. 27.

—Mr. Wm. G. Raymond, of San Francisco, Cal., has accepted the chair of Geodesy, Road Engineer and Topographical Drawing in the Rensselaer Polytechnic Institute in Troy, New York.

—President Van Horne, of the Canadian Pacific, and Mr. R. B. Angus, of Montreal, a director of the company, left for England on the steamship "Furst Bismarck" from New York, this week.

—Mr. John Medway has been appointed Superintendent of Motive Power of the Fitchburg road, in place of Mr. Orlando Stewart, resigned, and resumed charge of that department on Sept. 1.

—Mr. C. L. Addison, who has been Signal Engineer of the Long Island road for some time, has resigned to accept a position with the Johnson Railroad & Signal Co. His resignation will take effect on Sept. 7.

—Mr. E. T. Colbran, Chief Clerk of the freight department of the Colorado Midland, has been appointed Acting General Freight Agent in place of Mr. J. K. Waterman, whose resignation was announced last week.

—Sir Henry Tyler, President of the Grand Trunk, has arrived in Canada, upon his annual visit, for the purpose of inspecting the road. The papers print the usual report that Sir Henry will endeavor to reduce the expenses.

—Mr. C. A. Fisher, General Manager of the St. Louis, Alton & Springfield, resigned Sept. 1. No successor has yet been decided upon. Mr. Fisher was the organizer of the syndicate which in 1866 brought the line from Bates to Grafton, Ill., and built it into Alton.

—Mr. James T. Leighton, a member of the M. C. B. Association, and well known among older railroad officers in the East, died suddenly at Portland, Me., last week. He was born in Portland, but his home has been in New Haven, Conn., for many years. He was a partner in the old New Haven Car Works about 20 years ago, and was connected at various times with the Jackson & Sharp Co., the old Baker Heating Co., and the Sewall Steam Heating Co.

—Mr. G. P. Neele, Superintendent of the London & North Western, has received from Queen Victoria, as a recognition of his services, a handsome massive clock with chiming bells, presented by the Queen in recognition of the care and attention he has given to her comfort and safety when travelling on the London & North Western Railway for the last 31 years. The Queen goes to Osborne by special train twice a year, and Mr. Neele has personally accompanied the train on each occasion.

—Mr. David W. Rider, who has been General Superintendent of the Jacksonville Southeastern lines for about three years, resigned last week, and has been succeeded by Mr. C. A. Henderson, who has been connected with the operating department of the road for some time. Mr. Rider was formerly Secretary and Chief Clerk for the Receiver of the Wabash, and some time after the lines now forming the Jacksonville Southeastern were separated from that system, he became General Superintendent. He was also Superintendent of the Peoria & Pekin Union road in 1881, and he has served as brakeman, conductor, yard master and station agent on western roads.

—The appointment of Mr. W. T. Manning as Chief Engineer of the Baltimore Belt road was noted last week. Mr. Manning now has the following titles on this system: Assistant Chief Engineer of the Baltimore & Ohio, Chief Engineer of the Baltimore Belt and the Staten Island Rapid Transit, and Consulting Engineer of the Pittsburgh & Western and Pittsburgh Junction. Mr. Manning has also been the acting chief engineer for the entire Baltimore & Ohio system for the past four months. He has been in the service of that road for nineteen years and has filled every position in engineering service, and was in the maintenance of way department for eight years.

—Mr. Michael Gilles is to assume the duties of General Superintendent of the Louisville, New Orleans & Texas on Sept. 1. He has been Superintendent of the Iowa Division of the Illinois Central since 1883, and has been connected with that company for over 30 years. He first entered the company's service as a porter at Amboy, Ill., and was also clerk in the freight and division engineer's offices at that point. In 1888 he became Division Engineer at Dubuque, Ia., and in 1877 Road Master, and Division Superintendent in 1883. Mr. E. G. Russell, who has been Superintendent of Transportation, with office at Chicago, has been appointed Superintendent of the Iowa lines of the Illinois Central to succeed Mr. Gilles.

ELECTIONS AND APPOINTMENTS.

Charleston, Cincinnati & Chicago (Tenn).—Samuel Hunt, general manager and agent for the purchasers, has removed his offices from Cincinnati to the Bullitt Building, Philadelphia. The office of J. J. Collier, Comptroller, has also been removed to Philadelphia.

Chicago, Milwaukee & St. Paul.—The headquarters of H. C. Pierpont, Division Freight Agent, have been transferred from Winona, Minn., to La Crosse, Wis.

Crystal River.—The following is a list of the officers of this new company: J. C. Osgood, President, No. 18 Broadway, New York City; J. A. Kebler, Vice-President and General Manager; D. C. Beaman, Secretary; A. C. Cass, Treasurer; T. H. Wigglesworth, Chief Engineer; all of Boston Building, Denver.

East Tennessee, Virginia & Georgia.—Judge W. A. Henderson has been appointed General Counsel of the road, to succeed William M. Baxter, who was stricken with paralysis last week.

Illinois Central.—William J. Gillingham, Jr., has been appointed Signal Engineer, with headquarters at Chicago, reporting to the Chief Engineer.

Minneapolis, St. Paul & Sault Ste. Marie.—Charles F. Clement has been appointed Secretary and Treasurer, succeeding W. L. Martin, appointed General Freight Agent.

Montgomery, Hayneville & Camden.—At a meeting of the stockholders, held at Camden, Ala., Aug. 23, an organization was effected by electing Hon. S. D. Bloch President; R. E. McWilliams, I. E. Starr, J. T. Beck, I. D. Bloch, and D. Palmer, of Wilcox county; Hon. Willis Brewer, of Lowndes, and Capt. John W. Durr, of Montgomery, directors.

Northeastern California.—D. E. Miles, L. D. Brewster, Henry L. Tatum, J. J. Bowen, A. M. Willis, S. P. Smiley and K. A. Lancaster have filed articles of incorporation of the company in Philadelphia.

Northern Pacific.—The division headquarters of the operating department have been transferred from West Superior, Wis., to Duluth. W. R. Mitchell has been appointed counsel of the St. Paul, vice John C. Bullitt, Jr., who continues his connection with the company as advisory counsel.

Ohio Southern.—J. F. Youse, formerly agent of the Cincinnati, Hamilton & Dayton, in Cleveland, has been appointed General Freight Agent of the road, to succeed B. H. Roche, resigned. Mr. Youse will begin his new duties about Sept. 15.

Rapid River & Eastern.—The names of the incorporators of this company are as follows: John B. Stanmour, Chicago; Jacob N. Rickers, Coldwater, Mich.; William J. Getty, Wm. H. Brooks, James M. Flagg, Newell A. French, Kalkaska, Mich., and James E. Hamilton, Fife Lake, Mich.

San Antonio & Aransas Pass.—W. F. Jones has been appointed Traveling Freight Agent, with headquarters at Waco, Tex.

South Florida.—Dr. C. C. Haskell having resigned the office of Treasurer of this railroad, to take effect Sept. 1, J. Moultrie Lee, Treasurer of the Savannah, Florida & Western, Savannah, Ga., has been appointed Acting Treasurer of the road.

Willbur McCoy having resigned his position as auditor, for the purpose of giving his undivided time to the traffic department, J. W. Kelly has been appointed Acting Auditor. M. E. Bishop has been appointed Acting Cashier, with office at Sanford, Fla.

Tri-City Terminal.—The list of incorporators of this company filed with the Secretary of State of Illinois last week, included the names of 27 residents of Rock Island, Ill. Following will be found the first six names: Wm. Jackson, Henry Carse, Virgil M. Blauding, F. Weyerhaeuser, Otto Huber and Frederick Hess.

Youghiogheny Central.—The following are the incorporators of the Pennsylvania company: T. J. Mitchell, of Connellsville, Pa., President; Thomas Johns, Moyer, Pa.; Archie Cummins and W. T. Rainey, of Pittsburgh; A. J. Hill, Vanderbilt, W. J. Rainey and H. J. G. Mechner, of Cleveland, Ohio, and T. R. Bradford and James H. Harper, of Connellsville.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Altoona, Clearfield & Northern.—The elevated terminal of this road to be erected in the city of Altoona, Pa., will consist of 1,800 ft. in length of structural work, and will be 15 ft. high and double tracked. It has not yet been definitely decided what material will be used, but it will probably be wood. A branch 1½ miles long is being built by McGovern Bros., of Tyrone, Pa., from Coleman's Station on the present line of the road to the city of Altoona, where the elevated terminal will be built. F. G. Patterson, of Altoona, is President and General Manager.

Atlanta & Florida.—Judge Marshall J. Clarke, at Atlanta, Ga., has denied the petition of the Central Trust Co., of New York, asking the removal of T. W. Garrett as receiver of the company.

British Mexican.—Contractor David Shaw has entered into a contract with this company, formed at Glasgow, Scotland, to build 180 miles of road from Jimenez to Jaco and from Jaco to the Sierra Mojada. Work was commenced last week, the grading outfit being shipped from the City of Mexico Aug. 12. The line will probably be completed in 1893. —*Mexican Financier.*

Canadian Pacific.—This company has commenced operations at Renfrew, Ont., west of Ottawa, on the proposed extension to Parry Sound, Ont. The work is being carried on by day's labor, but the company is reported to have called for tenders for grading. It is intended according to reports to reach Douglas in October, and to complete the work if possible as far as Eganville, which is about 22 miles from Arnprior, by January.

Chicago Union Elevated.—A charter for this company was filed in Illinois last week, the incorporators being Samuel A. Craig, Thomas Boyle and others in Chicago.

Clayton & Pea Ridge.—The Clayton & Pea Ridge Railway & Coal Co., principal office, Clayton, Ill., has filed articles of incorporation in Illinois. The proposed road is to be constructed from Clayton, Adams County, through Pea Ridge, Brown County, to a point in Schuyler County. The capital stock is \$200,000, and the incorporators are Thomas J. Clark, James Brady, B. W. Bryant, and others.

Crystal River.—This company has been recently organized in Colorado by the Colorado Coal & Iron Co., as already reported. The road will start from a point near Carbondale, on the Denver & Rio Grande, and near Sands on the Colorado Midland, in Garfield County, Colorado, extending nearly due south up the valley of the Crystal River, through the towns of Janeway, Prospect, Clarence, Marble, to a point three miles beyond Marble, a total distance of about 30 miles. In addition to the above, a branch will be built starting from the mouth of Coal Creek, 17 miles south of Carbondale, and thence westerly up the creek 11 miles. The surveys are practically completed and the company expects to build this year. The contracts for grading and tracklaying will be let within a month. The work on the Crystal River division will be average mountain work. The maximum grades are two and a half per cent, and the curves 20 degrees. On the Coal Creek branch there is heavy mountain work; the maximum grades are four per cent, and the curves 66 degrees. There will be no iron bridges and no trestles or tunnels of importance. J. A. Kebler, of Denver, is Vice-President and General Manager.

Cumberland Valley.—The engineers who have been at work for some months revising the survey made a few years ago to the Broad Top coal region completed their work last week. The survey was made from Richmond across the mountains about 40 miles to Mt. Dallas, the southern terminus of the Huntingdon & Broad Top Road.

Dakota, Wyoming & Missouri River.—Tracklaying was begun last week with material for the first five miles west from Rapid City, S. D. Rails for the balance of the line already graded, 28 miles, have been ordered forward, and the track will be completed within a month.

Duluth & Iron Range.—About 400 men have been engaged on the grading of the Western Mesaba branch in northern Minnesota for some time past, and it was expected to complete the grading on the entire branch this

week so that the tracklaying could begin on Sept. 1. The track is to be laid by the company's own forces, but Winston Bros., of Minneapolis, have the contracts for the grading and bridge work. The length of the new branch is 15½ miles, and it leaves the main line one mile south of Allen, the junction point being named Western Mesaba Junction, and it extends westerly and southwesterly to the Canton Mine in Section 3, Twp. 58, Range 16, in the Mesaba iron range. R. Angus, of Duluth, is Chief Engineer, and W. A. McGonagle is Engineer in Charge.

Duluth, Mississippi River & Northern.—The first section of 17 miles from Swan River, Minn., north, is practically graded, and the tracklaying has begun, and is progressing at the rate of half a mile a day. The preliminary surveys have just begun for a six-mile branch and a 25-mile extension of the main line. The branch, and as much of the main line as possible, will be completed this fall. Grant, Foley Bros. & Guthrie, of St. Paul, are the contractors for grading and tracklaying on the first section of 17 miles. No other work is as yet under contract. Shipley & Morris have the bridging, which consists of two short trestles, with one 60-ft. span in each. W. A. Dafer, of Swan River, is Chief Engineer.

Elgin, Joliet & Eastern.—The local papers print news regularly of the progress of a survey which it is reported this company is making for an extension from McCool, Ill., its eastern terminus, through Chesterton and Porter to Michigan City, Ind., about 15 miles.

Everett & Monte Cristo.—Over 1,500 men are reported to be working on the construction of this road in Snohomish County, Wash. The contract for the line from Hartford to the mines at Monte Cristo, Wash., 40 miles, was let to Henry & Balch, now of Seattle, and the work has been sublet as follows: Earle & Donahue, 3½ miles; P. Olson, 3 miles; Charles Johnson, 3 miles; M. Earle, 4 miles; Eldridge & Ryan, 2½ miles; McGee, 4 miles; Bowman & Payne 3½ miles; P. H. Smith & Bro., 5 miles. Several gaps of two or three miles each are being done by the Company directly. The road is an extension of the former Snohomish, Skykomish & Spokane, built from Everett to Snohomish. Trackage rights have been secured over the Seattle Lake Shore & Eastern to Hartford, Wash., and the new line is being built from that point. The work was begun in March, and the tracklaying was begun a few weeks ago at Hartford. The work is in various stages of completion. The road has been graded ready for the track from Hartford to Granite Falls, and the rails, 60 lb., are being laid; from Granite to Bogardus a large part of the grading is completed. The heavy work in the Stillaguamish canyon, where the longest tunnel will be built, is delaying work. Over 800 men are working in the canyon, and the tunnel will be completed in a few days. From Bogardus to Silverton, 13 miles, about one-half the road is graded, although a considerable portion is not yet cleared. From Silverton to Monte Cristo not much work has been done, but a very large force of men is at work. From Hartford the road follows the Pilchuck River to Granite Falls through a level and fertile district. From Granite Falls the route is along the Stillaguamish River to within a few miles of Monte Cristo, where the route is along Palmer Creek. The country to Monte Cristo is chiefly timber and mining land, with some farms. There are in all 55 bridges, three of iron, one a two-span and two one-span. The greatest curve is 13 deg., and the grade is 129 ft. to the mile. The roadbed is being rock-balled along most of its length. There are seven tunnels, varying in length from 50 to 880 ft.

Findlay, Fort Wayne & Western.—A contract was awarded to F. B. Douglas, last week to construct the road from the Ohio state line to Fort Wayne, Ind., a distance of 18 miles.

Fredericton & Woodstock.—The survey of the proposed railway from Fredericton northwest to Woodstock, N. B., about 65 miles, will be completed in about two weeks. A meeting will then be held by the company to consider the report of the engineers.

Georgia Southern & Florida.—Receiver W. B. Sparks has petitioned the Georgia Superior Court for permission to borrow \$400,000 for the purpose of building a branch from Tifton to Thomasville. This line was in course of construction when the road went into the hands of a Receiver, and no work has been done on it for a year and a half.

Goshen Belt.—The local company, of which F. E. C. Hawks, Goshen, Ind., is President, has finally made an agreement with the Cleveland, Cincinnati, Chicago & St. Louis for building this road. The route is about two miles in length, connecting with the Lake Shore & Michigan Southern in the northwestern part of Goshen, and extending south to and along the canal bank, about 1½ miles; thence east to the C. C. & St. L. R. R. It is virtually a belt road. There is but little grading to be done, as the country is level. Four bridges will be built, but none of them are long. The exact route is not yet fully settled, but probably will be this week, and work will then be commenced at once.

Iron Range & Huron Bay.—This road is now nearing completion. The grading is completed, and 18 miles of rails have been laid between Champion and Escanaba, Mich.

Jellico & Bird's Eye.—The contract for the grading, masonry, cross-ties, etc., on the 7½ miles from Jellico to the Bird's Eye coal mines in Whitley County, Ky., was awarded last week to the Chattanooga Construction Co. A separate contract for an iron bridge, 152 ft. span, was let. The present address of the Chattanooga Construction Co. is Jellico, Tenn. The work will begin at once. The maximum grades with traffic are 1½ per cent. The maximum curves are eight degrees. The Bird's Eye Coal Co. will want to purchase eight miles of 60-lb. steel rails, track fastenings and locomotives, and also track and tipper scales, bank cars, etc. complete for a mine of 1,000 tons daily capacity. The company will also consider propositions for coal cutting, machinery and underground haulage. The officers of the Bird's Eye Coal Co. are E. T. Halsey, President; W. L. Halsey, Secretary; both of Louisville, Ky., and W. C. Crozer, Chief Engineer, Knoxville, Tenn.

Konkapot Valley.—Reference has already been made to the incorporation of this road in Massachusetts. The road will extend from a point in the village of Mill River in the town of New Marlborough, thence southerly along the Konkapot River valley through to the Connecticut State line. The capital stock is not to exceed \$150,000 and the company may issue bonds to the extent of \$10,000 a mile on the road, and also lease its line to the Housatonic or other connecting road. Henry L. Langham, James H. Lyles, H. Dwight Sisson are the directors.

Lake Erie & Detroit River.—The route of the eastern extension has been definitely located through Blenheim to Ridgetown, Ont. Contracts for grading 12 miles east of Merlin are now being awarded and the 28 miles east of Leamington to Merlin has been graded.

La Porte, Houston & Northern.—The grading is progressing rapidly from La Porte on Trinity Bay, and T. J. Collins, the contractor, reports that the work has been completed for about one-third of the distance to Houston, Tex., which is 20 miles northwest of La Porte.

Middle Georgia & Atlantic.—Press despatches state subscriptions amounting to about \$70,000 have been secured to build the proposed western extensions from Macon northwest to Covington and to Social Circle, Ga. These lines were located some time ago, and part of the right of way graded, and it is estimated that they can be completed by an expenditure of \$175,000.

Missouri, Kansas & Texas.—Burkitt, Burns & Co., who are building the branch to Lockhart, Tex., were awarded the contract last week for the branch from Boggy Tank into Houston, Tex., a distance of about 80 miles. The survey for the latter line is now being made and will be completed in a few weeks. The location has been decided upon from Boggy Tank to Sealey on the Brazos River, about 10 miles, and the grading will begin at once on this section. It is reported that 15 miles of track has been laid west of Smithville toward Lockhart, and this line will be completed early in September.

Montpelier & Chicago.—President Ashley, of the Wabash, which is building this road, says that so far about 30 miles of track has been laid on the new road and the work is going ahead at the rate of about two miles a day. Grading and bridging is well along, so that the officers hope to open the line before Jan. 1. The road will be almost an air line, with grades nowhere exceeding 20 ft. to the mile.

Montgomery, Hayneville & Camden.—The organization of the company was completed at Montgomery, Ala., on Aug. 23, and new officers elected. S. D. Bloch, of Camden, Ala., president of the company, states that the contract for grading the first 10 miles from Camden will be let immediately. The road was surveyed last year from Montgomery southwest through Hayneville to Camden a distance of 75 miles.

Nelson & Fort Sheppard.—President D. C. Corbin, of Spokane, Wash., has given some details regarding this project and correcting current reports. Two years ago he applied for charters for the road in British Columbia but failed to secure them, and the Dominion Government also declined to grant a charter. A year later, however, a provincial company was granted a charter to build from Fort Sheppard, north to Nelson, B. C., on the arm of the Kootenai Lake, and a land grant of 10,240 acres of land a mile was granted by the provincial government. Last month Mr. Corbin complied with all legal requirements of the government, and deposited \$25,000 with his agreement to build the road. Two parties of surveyors are now on the line, and it is probable that another party may be sent out soon in order to make the definite location before winter. The length of the line will be 65 miles and not 120 miles, as has been stated. There is no idea of extending the road to Revelstoke, B. C., on the Canadian Pacific. He says that the objective point of the road is the Kootenai Lake country, which will be reached at Nelson. Practically the new road will be an extension of the Spokane & Northern. President Corbin and Chief Engineer Roberts have made an inspection of the proposed line, and as it follows the waterways the entire distance the grades are easy and the road will not be hard to build. It will pass through a well timbered country, included in the land grant. It will cost, as estimated, about \$20,000 per mile. The line from Fort Sheppard, near the national boundary, follows Beaver Creek and Salmon Creek to Toad Mountain, thence following Cottonwood Creek to Nelson, on the navigable arm of the Kootenai Lake.

New Roads.—Robert Govan, of Chelan Falls, Wash., is making surveys for a new road to be built by a company called the Manhattan Company, recently organized. It is proposed to build part of the road this fall, and then extend it from Lakeside to Chelan Falls, Wash., next year.

Delegates from Fresno, San Benito and Monterey counties met at Monterey, Cal., on Aug. 20, to consider the building of a road from Monterey southeast to Fresno, Cal., which is proposed by H. A. Greene, of Monterey, Cal. Two surveys have been made, one line being 133 miles long and the other 157 miles, the latter being by way of Silver Creek and Panoche Valley, on which the maximum grade will be 85 ft. to the mile. W. C. Alberger, of San Francisco, the Chief Engineer, says that the right of way for over 70 miles has already been promised to the company.

It is reported that arrangements are being made for the construction of a road from the New York Phosphate Co.'s mine to Martel, Fla., on the Silver Springs, Ocala & Gulf road.

R. H. Fitzhugh is making an examination for the Board of Trade of Franklin, N. C., as to the feasibility and advisability of building the proposed railroad from Walhalla via Rabun Gap and Franklin, N. C., to the Tennessee line.

Surveys have been made for a new road from Phoenix northeast to Onyx and other mines on Cave Creek, about 15 miles.

The following dispatch comes from Eureka, Cal.: "A railroad meeting was held Aug. 24, at which the surveyors' report of the route to southeast Red Bluff, declaring it impracticable and estimating the cost at \$7,000,000, was read. Marcus Pollasky offered to pay half the expenses of another survey to Sacramento County, farther south. The proposition was accepted and the Committee ordered to make a survey."

New York, New Haven & Hartford.—The cut shows the present line through Fair Haven, Conn., and the proposed relocation further north. The new route will be about three miles long and will hardly be completed before Jan. 1, 1894. The work will cost about \$430,000. The bridge over the Quinnipiac River on the present line is 1,200 ft. long, but on the new line the bridge will be only about 150 ft. long. The new line extends through a marsh for about 1,000 ft. and it is proposed to build an embankment for about 2,000 ft. and a trestle for the balance of the distance. It is proposed to build a tunnel 900 ft. long if the rock is hard enough so as not to require arching. If the hill is soft a through cut will be made. The widening of the present road way for a second track would have been very expensive, not only in land damages, but in excavation. The new line not only avoids the long bridge, but also, as will be seen, from 12 to 15 grade crossings.



It is expected to complete the second track on the New London Division between New London and New Haven, with the exception of this cut-off, by next April or May so as to have the use of it next summer. On the New York Division of this road the work of making plans and buying right of way for additional tracks between New Haven and Bridgeport is progressing.

Northeastern California.—This company has been incorporated for the purpose of building a road from Castle Crag, Shasta County, Cal., northeasterly into Siskiyou County. The estimated length of the road is 30 miles. The capital stock is \$1,000,000, of which \$150,000 has been subscribed. The road will be built by the Red Cross Lumber Co., which is operating near Castle Crag. It will connect with the Southern Pacific at Castle Crag and reach the timber of the McCloud River, northeast of Castle Crag. D. E. Miles and E. G. Lancaster are directors.

Northern Pacific.—Prominent officials of the Northern Pacific say there is no truth in the rumor that a cut off will be built through the Okanogan country by way of Wards Pass and Lake Chelan. They say that the cut off, which will be built sometime in the future, will start from the Bitter Road Valley south of Missoula, Mont., and extend through the Lolo Pass down the Clearwater River, traversing the wheat fields of the Palouse country to the Snake River, which will be followed to Pasco, Wash. When that line is completed the Northern Pacific will have the best road for local business that can be built in the Western country.

Ohio & West Virginia.—A press report states that only 19 miles of track remains to be laid to complete this extension.

Oscawana & Cornell.—Rights of way are now being obtained for this road so as to commence construction immediately, the location having already been made by the engineers under the direction of Oliver W. Barnes, 57 Broadway, New York, as Chief Engineer. As reported last week, the road is to be about four miles long in Westchester County, N. Y., from Oscawana station on the New York Central & Hudson River road to the site of the proposed aqueduct dam on the Croton River near Cornell. The object of the line is mainly to supply granite for the new dam to be constructed by the aqueduct commission. The line passes through a granite ledge 1½ miles north of the dam site from which ashlar of any convenient size can be quarried and carried by rail to the site of the dam. The supply of granite and rubble stone is very large. There is also on the line a wide stratum of white marble suitable for architectural work, and deposits of emery and magnetic iron ore. The character of the work to be done is mostly earth and some rock cutting, but no bridging of any consequence. The maximum gradient will be 2½ per cent. and the elevation to be overcome is 300 ft.

Oxford & Coast Line.—Work on the construction of this short road will commence at once near Oxford, N. C., and only one mile of road remains to be graded.

Paducah, Tennessee & Alabama.—The tracks is now being laid south of Hollow Rock, Tenn., and as the grading has been completed for nearly the entire distance to Lexington, 30 miles south, it is expected to complete the tracklaying in September. Sullivan, Johnson & McLaughlin are the contractors.

Philadelphia & New England.—A party of engineers was organized at Stroudsburg, Pa., last week under W. H. Tinsman, to survey the line from that town through the Delaware River Valley northeast to Port Jervis, N. Y., 42 miles. J. E. Bloom, of New York, the projector of the road, has been addressing local meetings at Port Jervis, Kingston, and at various towns between those places for some weeks past, asking local subscriptions to the stock of the company.

Philadelphia & Reading.—Active preparations are being made for the beginning of work on the new six mile line from Exton, on the Chester Valley branch to West Chester, Pa. Nearly all the right of way has been secured and other preliminaries arranged.

The surveyed route of the Bristol & Langhorne branch leaves the Round Brook road at Langhorne, and passes through the outskirts of Halmerville and Newportville, and enters Bristol, Pa., in the center of the town.

Surveys are being made near Gettysburg, Pa., on the southern end of the road formerly known as the Gettysburg & Harrisburg now operated by this company. It is reported that the road will be rebuilt between Idaville and Gettysburg, shortening the distance between these towns about two miles.

Portland & Rumford Falls.—A. F. Hilton, of Alna, Me., is making a survey for an extension from Mechanic Falls to Lewiston, and Auburn, Me., and the survey has already reached Minot Corner.

Pittsburgh, Ohio Valley and Cincinnati.—The railroad bridge at Powhatan, O., is expected to be completed in a few weeks, and the road will be open for travel by Oct. 1, when trains will run from Bellaire along the Ohio River to Powhatan.

Pittsburgh & Western.—The grading for the second track between Evans City and Callery Junction has been practically completed. The contract is reported to have been let for the new line between Wildwood and Downeyville Station, although the engineers have not finished revising the location. The old Bakerstown tunnel will be abandoned and the new line will be about a mile west of the present location, avoiding the heavy grade between Wildwood and Bakerstown, but a tunnel about the length of the Bakerstown tunnel will be necessary.

Quaker City Elevated.—The local officers make positive statements that the elevated road along Market street will be built at once. This is quite contrary to local opinion and the only work so far undertaken is the commencement of an excavation which is supposed to be for one of the piers of the elevated structure. However, the attorney of the company says that "a controlling interest in the capital stock of the company has been purchased by New York capitalists, and they intend to push the enterprise. The company will be reorganized and new officers elected. The resignation of President Thomas Briggs is already in the hands of the directors. The particulars of the reorganization will soon be made public." It is understood that August Belmont & Co., Vermilye & Co., and Edward Sweet & Co., of New York, who became special surety in the sum of \$100,000 to insure the building of the road, will be interested in the enterprise.

Rapid River & Eastern.—The route of this road, recently incorporated in Michigan, is from a point near the Torch River, in Kalkaska County, to the village of Kalkaska, a distance of 15 miles. The capital stock is \$120,000. The names of the incorporators are given in another column.

Southbridge, Sturbridge & Brookfield.—The locating survey is now about completed and it is expected that the contracts for building the road will be awarded soon. The new road is to be a connecting link between Southbridge, Mass., which is the western terminus of a branch of the New York and New England, and the Boston & Albany which it intersects about a mile west of East Brookfield. The distance is 13½ miles and, with the exception of two miles in the southern or Southbridge end, the road will be comparatively easy to build. It passes up the valley of the Quinebaug River through Westville and other villages which have undeveloped water powers. The road leaves the valley of the Quinebaug River near Fiskdale and passes up on the west shore of a chain of ponds. On these shores are large quantities of clay and sand of excellent quality for brick making and one large brick yard is already in operation. At the outlet of the ponds a drawbridge will be built. The grade along these ponds will be very easy, and in no place will there be a cut or fill of more than 12 ft. in the 10 miles. About \$130,000 has already been subscribed to build the road, and 25 per cent. paid in. The road will give Southbridge a western outlet, which it needs, and will make both Southbridge and Sturbridge Boston shipping points from the West. Freight from the West for the Quinebaug and Blackstone valleys now goes via Worcester over the Boston & Albany, which has a heavy grade at Charlton, but the grade on the new road will be light. James A. Fiske and C. Curry, of Boston, respectively President and Treasurer of the Fiskdale Mills Co., are President and Treasurer of the road. A. C. Moore, of Sturbridge, Mass., is Clerk and Chief Engineer. The principal promoter of the enterprise is C. C. Sanderson, of Dedham, Mass.

Tennessee Midland.—T. J. Moss, President of the road, has filed in the Davidson County Court a petition asking the county to subscribe to \$350,000 of its capital stock, and agreeing to construct and operate the road from East Perryville east to Nashville provided this subscription is made. Judge Caldwell immediately called an extra session of the court to consider the petition on Sept. 12.

Texas Central.—The local papers report that a survey is being made from Rose into Waco, Tex., 11 miles. The company at present has trackage rights over the Houston & Texas Central between these points.

Toledo, Walhonding Valley & Ohio.—This road has now been completed to Loudonville, O., with the exception of about 12 miles of track. It is being built as a branch of the Pennsylvania company, and is to extend from Loudonville south to Coshocton, O., a distance of about 40 miles, connecting the northwest and southwest divisions of the system, and giving a more direct route from Toledo to the coal fields in the Walhonding Valley.

Unadilla Valley.—It is said that the contract for the construction of the road has been let to G. M. Rustlin, of New York, that work will commence in one week, and that the road will be built to Leonardville and West Edmeston, N. Y., this year.

Williamsport & North Branch.—E. J. Gaynor, Son & Co., Pottsville, Pa., is the name and address of the firm awarded the contract last week for the gradation and masonry of the extension of the road from its present terminus, Nordmont, Pa., to a connection with the Lehigh Valley at Dohm's Summit, a distance of 17½ miles.

Wilkes-Barre & Eastern.—It is reported that sub-contracts are being let for the eastern section of this road by McCabe, Noble & Strang, of Atlanta, Ga., whose present headquarters are at Stroudsburg, Pa. The road is to extend from Wilkes-Barre southeast to Stroudsburg, about 60 miles, and grading has been going on for some months with a small force employed by the company. W. P. Ryman, of Wilkes-Barre, is President.

Youghiogheny Central.—A charter was granted to this company in Pennsylvania last week. It is to extend from the Rainey Coke Works on the right bank of the Youghiogheny River, about one-half mile above the town of Dawson, Fayette County, Pa., thence crossing the Youghiogheny River to the left bank and extending to the Paul Coke Works near Vanderbilt, Fayette County, Pa. The length of the road will be about five miles. The capital stock is \$200,000. Thomas J. Mitchell, of Connellsville, Pa., is President.

GENERAL RAILROAD NEWS.

Central of New Jersey.—The earnings and expenses of the operation of the Port Reading, lessee of the road, for the month of July, are as follows:

	1902.	1891.	Inc. or dec.
Gross earnings.....	\$1,310,921	\$1,234,528	D. \$76,393
Operating expenses.....	745,850	738,536	L. 7,314
Net earnings.....	\$565,071	\$495,992	D. \$69,079

Seven months ending July 31.

Gross earnings	\$8,651,141	\$7,839,796	I.	\$811,345
Operating expenses	4,717,902	4,542,051	I.	175,851

Net earnings.....\$3,933,239 \$3,297,745 I. \$635,494

An order was issued on Aug. 31 by President Maxwell announcing that the company had formally resumed control of its property leased to the Port Reading in March last, the Court of Chancery of New Jersey having issued an order enjoining the Port Reading from further operating the road under the lease.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses and net earnings of the road and its auxiliary lines for July were as follows:

	Gross earn.	Oper. expen.	Net earn.	Mile- age.
Atchison, Topeka & Santa Fe	\$2,943,007	\$1,974,876	\$968,131	0,543
Roads jointly owned	145,653	127,952	17,701	367
Total, Atchison system	\$3,088,660	\$2,102,828	\$985,832	7,130
St. Louis & San Francisco	\$907,520	\$344,579	\$562,941	1,328
Roads jointly owned, Frisco Co., one-half	143,297	122,410	20,887	536
Total, Frisco system	\$750,817	\$466,989	\$283,819	1,864
Aggregate, both systems	\$3,839,477	\$2,569,817	\$1,269,651	8,994

The comparative statement for all lines is as below:

	Gross earn.	Net earn.	Per mile.	Gross earn.	Net earn.	Mile- age.
Atchison System, July, 1892	\$3,088,660	\$985,831	\$138.26	\$3,088,660	\$985,831	7,130
July, 1891	2,945,878	836,788	117.02	2,945,878	836,788	7,113
Increase July, 1892	\$142,782	\$149,043	\$2.06	\$142,782	\$149,043	15
St. Louis & San Francisco, July, 1892	\$907,520	\$562,941	\$138.26	\$907,520	\$562,941	1,328
July, 1891	708,996	245,340	131.71	708,996	245,340	1,862
Increase	\$198,524	\$317,601	\$2.55	\$198,524	\$317,601	1
Aggregate General System, July, 1892	\$3,839,477	\$1,269,651	\$141.16	\$3,839,477	\$1,269,651	8,994
July, 1891	3,654,873	1,082,129	120.54	3,654,873	1,082,129	8,977
Increase	\$184,604	\$187,522	\$2.62	\$184,604	\$187,522	17

Bristol, Elizabethton & North Carolina.—B. L. Dulaney and F. B. Hubbell, respectively, President and General Manager of the railroad, were appointed Receivers for the company at Bristol, Tenn., last week. The order appointing the Receivers was made in a suit brought by the creditors of the Unaka Construction Co., which is building the road, and is said to be a friendly suit. The line has just been completed from Bristol south to Elizabethton, N. C., and being extended beyond the latter point. It is reported that the construction work will not be interrupted, and the litigation will not interfere with the operation of the line.

Chicago, Burlington & Quincy.—The financial statement for July, including controlled roads, is as follows:

	1892.	1891.	Inc. or dec.
Gross earnings	\$3,214,135	\$2,671,494	I. \$542,641
Operating expenses	2,118,058	1,631,027	I. 487,031
Net earnings	\$1,096,077	\$1,040,467	D. \$55,610
Fixed charges	810,000	795,186	I. 14,814
Surplus	\$286,077	\$245,281	D. \$40,796

Seven months to July.

	1892.	1891.	Inc. or dec.
Gross earnings	\$21,450,975	\$17,531,081	I. \$3,919,894
Operating expenses	14,690,175	11,382,990	I. 3,307,185
Net earnings	\$6,760,800	\$6,148,092	I. \$612,708
Fixed charges	5,070,000	5,506,303	I. 436,303
Surplus	\$1,690,800	\$581,789	I. \$1,109,011

Cleveland, Cincinnati, Chicago & St. Louis.—The statement of earnings for June is as follows:

	1892.	1891.	Inc. or dec.
Gross earn.	\$1,239,315	\$1,060,750	I. \$178,565
Oper. expen.	\$41,532	\$82,908	I. 41,376
Net earn.	\$388,683	\$277,842	I. \$110,841
Fixed charges	229,330	226,382	D. 2,948
Surplus	\$169,353	\$151,460	I. \$17,893

For the fiscal year:

	1892.	1891.	Inc. or dec.
Gross earn.	\$13,818,115	\$13,134,438	I. \$683,677
Oper. expen.	9,538,542	9,105,992	I. 432,550
Net earn.	\$3,979,573	\$3,948,446	I. \$31,127
Fixed charges	2,570,174	2,592,710	D. 22,536
Surplus	\$1,409,399	\$1,347,736	I. \$61,663

Green Bay, Winona & St. Paul.—The reorganization has been practically completed, and it is understood that in a short time stock will be issued in exchange for the trust certificates. The new company will have \$2,000,000 preferred stock, \$8,000,000 common stock, and \$2,500,000 first mortgage 5 per cent., and \$3,781,000 second mortgage 4 per cent. bonds.

Intercolonial.—The earnings of the road for the fiscal year, ended June 30 last, show a marked reduction of the deficit that has obtained for several years past, the deficit being nearly \$200,000 less than that of the preceding year. The following are the comparative statements of expenditure and receipts for both years: Operating expenses, year ending June 30, 1891, \$3,062,341; receipts, \$2,907,305; deficit, \$654,946. Operating expenses, year ending June 30, 1892, \$3,439,377; receipts, \$2,945,411; deficit, \$493,966.

Joliet & St. Gabriel de Brandon.—The Canadian Pacific has purchased the Joliet & St. Gabriel de Brandon road, outright, from Ald. Prefontaine, of Montreal, and will incorporate it with the L'Assomption line into its system. It is now leased by the Canadian Pacific, and is only some 13 miles in length.

Lehigh Valley.—The result of the operation of the lessee for the month of June, 1892, is as follows:

	1892.	1891.	Inc. or dec.
Gross earnings	\$1,540,811	\$1,546,720	D. \$5,909
Operating expenses	1,089,239	1,176,236	D. 87,004
Net earnings	\$451,572	\$370,484	I. \$81,088

Seven months ending June 30.

	1892.	1891.	Inc. or dec.
Receipts	\$10,053,280	\$9,082,644	I. \$970,636
Expenses	7,790,430	7,528,941	I. 261,489
Earnings	\$2,262,850	\$1,553,703	I. \$709,147

New Jersey Junction.—Justice Gray, sitting as a United States Circuit Court Judge at Boston, has rendered a decision against the Pennsylvania in its long contested litigation with this road to prevent the latter from crossing the Pennsylvania's tracks at the Point of

Rocks in Jersey City. After all other efforts failed to keep the Junction Road from crossing its tracks, the Pennsylvania applied for a bill in equity in the United States Circuit Court at Trenton, praying for an injunction. This was argued before Judge Acheson in Philadelphia last April. He denied the application, and the present action followed. It was on a writ of error to secure a review of all the proceedings in the courts of New Jersey. The road is a terminal line similar to the belt line in Chicago, and its purpose is to afford an easy means of transfer of freight between the various trunk lines in Jersey. At present it extends from the West Shore Station in Weehawken to a junction with the Pennsylvania at the Point of Rocks, crossing the Erie and Delaware, Lackawanna & Western roads. The Junction Railroad was leased to the West Shore in 1886 for 100 years.

New York, Lake Erie & Western.—The earnings for July and the 10 months from Oct 10 were as follows:

	1892.	1891.	Inc. or dec.
Gross earnings	\$2,784,659	\$2,818,392	D. \$33,733
Oper. expenses	1,891,635	1,715,471	I. 176,164
Net earnings	\$893,024	\$1,102,921	D. \$209,897

Less proportions due to leased lines.....231,508

Net earnings.....\$661,516

Ten months Oct. 1 to July 31.

	1892.	1891.	Inc. or dec.
Gross earnings	\$25,377,594	\$24,269,113	I. \$1,108,481
Oper. expenses	17,446,302	15,912,338	I. 1,533,964
Net earnings	\$7,931,292	\$8,356,775	D. \$425,483

Less proportions due to leased lines.....2,157,398

Net earnings.....\$5,773,894

New York & New England.—President Charles Parsons was quoted as follows in an interview published last week in the Boston papers: "As far as I am aware there is absolutely no foundation for the talk about a receiver. There is absolutely no warrant for such rumors in the financial condition of the company and I believe there is no possible way in which the road could be put in the hands of a receiver. An arrangement was made with Drexel, Morgan & Co. two weeks ago by which the Company was relieved of all liabilities as guarantors of the New England Terminal Company's \$800,000 bonds and several hundred thousands of floating debt. The New England paid \$150,000 cash to Drexel, Morgan & Co. to be relieved of its guarantee."

Pennsylvania.—The comparative statement of all the lines east of Pittsburgh and Erie for July shows:

	1892.	1891.	Inc. or dec.
Gross earnings	\$5,378,690	\$5,079,770	I. \$298,920
Oper. expen.	4,185,463	3,904,596	I. 280,867
Net earnings	\$1,193,227	\$1,175,174	D. \$18,053

Seven months ending July 31.

	1892.	1891.	Inc. or dec.
Gross earnings	\$38,274,080	\$37,155,158	I. \$1,118,922
Oper. expen.	28,023,388	26,371,893	I. 1,651,495
Net earnings	\$10,250,692	\$10,783,265	D. \$532,573

All lines west of Pittsburgh and Erie for July, as compared with the same month of last year, show a decrease in gross earnings of \$156,811 and a decrease in net earnings of \$311,490. For the seven months ending July 31 the gross earnings show an increase of \$2,271,983 and net earnings a decrease of \$117,978.

Philadelphia & Reading.—The statement of the business for July, 1892, as compared with same month of 1891, is as follows:

	1892.	1891.	Inc. or dec.
Gross receipts	\$1,381,253	\$1,336,874	I. \$44,379
Oper. expen.	996,410	964,748	I. 31,662
Profit in oper.	\$384,843	\$372,126	I. \$12,717
Other receipts	107,127	81,375	I. 25,752
Profit for month	\$491,970	\$453,501	I. \$38,469
Exp. for perm. imp.	13,980	10,206	I. 3,774
Fixed charges	625,000	611,700	I. 13,300
Total	\$853,990	\$875,477	D. \$21,487
Surplus	\$332,990	\$282,594	I. \$50,396

The gross earnings of the Philadelphia & Reading Coal & Iron Co. for July were, \$1,381,253; gross expenses were \$1,272,683, and the surplus was \$108,570. The earnings for the fiscal year were \$13,803,867, expenses, \$13,619,105, the deficit being \$184,738, against a deficit of \$741,583 for 1891.

Pittsburgh & Western.—A meeting of the stockholders has been called for Oct. 14 to vote for an increase of \$1,500,000 in the capital stock, and a corresponding increase in the bonded indebtedness. The increase is intended to provide for the revision of the location and rebuilding of part of the line.

Rio Grande.—Last week a suit was filed in the District Court at Brownsville, Tex., to have a receiver appointed for the road, which is now operated by trustees. It extends along the Rio Grande River from Brownsville for 23 miles.

Wheeling Bridge & Terminal Co.—The press dispatch printed last week announcing that foreclosure proceedings had been begun there by F. K. Stearns, of New York, on a mortgage of \$350,000 on the property of the Terminal Co., of Wheeling, W. Va., and Martin's Ferry, O., valued at \$3,000,000, seems to have been misleading. According to the representatives of the companies in New York, the foreclosure proceedings are only a friendly suit brought by Mr. Stearns against the Terminal & Ferry Co., which is subsidiary to the Wheeling Bridge & Terminal Co., in order to secure some real-estate property lying in Martin's Ferry.

TRAFFIC.

Traffic Notes.

The Louisville, New Albany & Chicago has put on dining cars between Chicago and Louisville.

The Great Northern has given notice that it will withdraw from the Trans-Continental Association at the end of 60 days, the prescribed limit.

The Chicago papers state that the Atchison, Topeka & Santa Fe carried 10,380 passengers to Colorado during the five busiest days of the Knights Templar convalescence. The amount of receipts for the tickets is stated at \$116,020.

The flour mills of Minneapolis in the week ending Aug. 20 made 202,120 barrels of flour; for the week previous the output was 205,185 barrels. These records are more than 10 per cent. greater than for the same periods last year.

The International & Great Northern has issued a circular cancelling certain rates on cotton, the effect of which is to restore the tariff rates to an equality with those in

force before the State Railroad Commission made a reduction.

A press despatch states that the Saginaw Valley Car Service Association has refused to deliver cars in West Bay City. No explanation is given, but it would seem that the question of demurrage must have taken a serious shape to warrant such a sweeping measure.

The East Tennessee, Virginia & Georgia and allied roads have signed the new agreement of the Southern Railway & Steamship Association, which is designed to govern that body for one year. The agreement was drawn up several weeks ago, but these and other companies have been slow in giving their approval.

An officer of the Louisiana division of the Southern Pacific gives the following statistics of the quantity of rice shipped over that road during the past four years. It is expected that the total for the present year will be 50,000 tons:

	1888.....	3,500 tons	1889.....	15,500 tons
	1889.....	8,000 tons	1891.....	32,500 tons

The roads carrying anthracite coal to New York City and to the West, have agreed to advance freight rates on Sept. 10, but the representatives of the Pennsylvania road state that their company will not make the advance. The rate to Buffalo is to be increased from \$2.25 to \$2.50 a ton. It appears that the advance in the rate to New York Harbor will be 10 or 15 cents a ton.

The livestock men and other large shippers of Sioux City who have been complaining loudly at railroad rates for some time, are now preparing a complaint to lay before the Interstate Commerce Commission. The Duluth Chamber of Commerce has filed with the Interstate Commerce Commission a remonstrance against the demands of Minneapolis, that the rate on flour from Minneapolis to Duluth be reduced.

A Denver paper reported last week that 22 pieces of stray baggage, left over from the Knights Templar Convalescence were still lying in that city. About 150 pieces altogether were missing. The conduct of the passenger business on this occasion doubtless tested the abilities of the roads severely, but the account to which we refer throws all the blame for the miscarriage of baggage upon "the other fellow."

Union Pacific passenger officials say that the company did not make a cent profit during the five days that the road was held open for the passenger trains to the Denver Knights Templar convalescence. The company abandoned all its freight trains for five days to allow the special excursion trains to have free right of way, and in doing so the company lost more on its freight earnings than it realized from the passenger business.—Exchange.

The Railroad Commissioners of Texas, in consequence of the recent decision of Judge McCormick, of the United States Circuit Court at Dallas, have granted the application of the Weatherford, Mineral Wells & Northwestern for exemption from the operation of its tariff and orders on account of a notice received from the Texas & Pacific and the Gulf, Colorado & Santa Fe, that they will not honor joint rates made by the Weatherford, Mineral Wells & Northwestern in accordance with the tariffs issued by the Commission.

The merchants of Philadelphia who a year ago induced the Pennsylvania and the Baltimore & Ohio to grant stopovers at that city on through tickets from the West and South to New York, are now congratulating themselves that the concession has resulted in many sales of goods by Philadelphia wholesalers which otherwise would not have been made. The Chairman of the Board of Trade Committee having this matter in charge claims that this favor secured from the railroads is worth more than any investment that his organization has made for twenty years.

The Sunday passenger traffic between Philadelphia and the seashore continues large. It is stated that the traffic of the lines of the Philadelphia & Reading for the last ten Sundays (including Saturday in each case) has been 160,000 people, and of the Pennsylvania lines, 92,000 people. This statement refers to Atlantic City only. The Cape May traffic of the Pennsylvania goes by a different line. Large numbers of people go from Philadelphia to Long Branch on Sunday, and also to interior resorts, and it is said that the total number of persons leaving the city for recreation on Aug. 27 and 28 was 70,000.

The movement of green fruit eastward from California is heavier this year than ever before. A recent number of the San Francisco Examiner reported 318 carloads as going east over the Central Pacific in seven days, the total weight of the freight being 3,816 tons. This is an average of 43½ cars daily. On one day 65 cars of peaches, plums, pears and grapes went over the Sierra Nevada mountains. On this portion of the road only 13 cars can be taken in a train. East of Truckee about 20 cars are hauled in each train. The railroads have quickened the time of these special freight trains so satisfactorily that no passenger train shipments of fruit are being made this year. The average rate received for transportation is \$1.25 per 100 lbs. to Chicago. A despatch from Sacramento, Aug. 25, reported a scarcity of fruit cars.

Chicago Traffic Matters.

CHICAGO, Aug. 31, 1892.

The case of the officials of the Illinois Steel Company who refused to answer inquiries made by the Interstate Commerce Commission, in its last rate investigation in this city, will come up before Judge Gresham on Sept. 6.

The grain movement throughout the West is now so general that all the roads report a lively demand for cars, and in some localities the condition approaches what is usually called a car famine. The Chicago, Burlington & Quincy expects to show for the month of August the largest month's traffic in its history.

Chairman Midgley has called a meeting for Sept. 7 to consider irregularities in freight rates. It is supposed that this is one more attempt to discover who it is that carries grain from west of the Missouri to eastern points at secret rates, which are somewhat under the tariff, but the prospects of success in this line are no better than heretofore.

It is probable that the roads of the Central Traffic Association will run a number of excursions to the World's Fair Grounds during September from points within 150 miles.

Texas Rates.

The papers in the Federal injunction suit granted by Judge McCormick at Dallas were formally served on the Railroad Commissioners at Austin, Tex., Aug. 25. Chairman Reagan stated that in obedience to the injunction the Commission would not further interfere with the four roads concerned in procuring the injunction. The Commission will go on as formerly, making rates for the roads not included in the injunction.

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JOHN CALDWELL,
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The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 252,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception



193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

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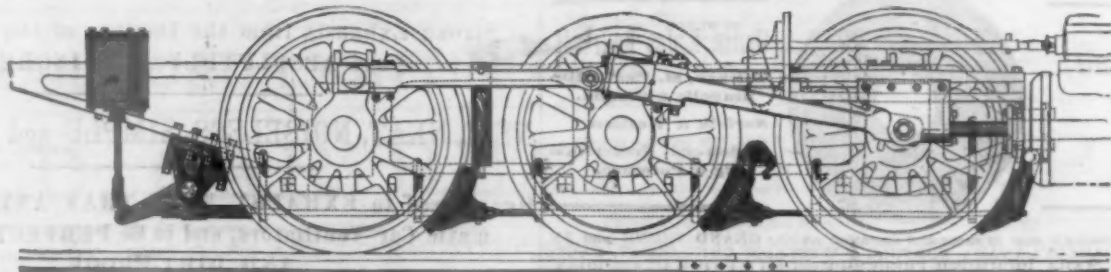
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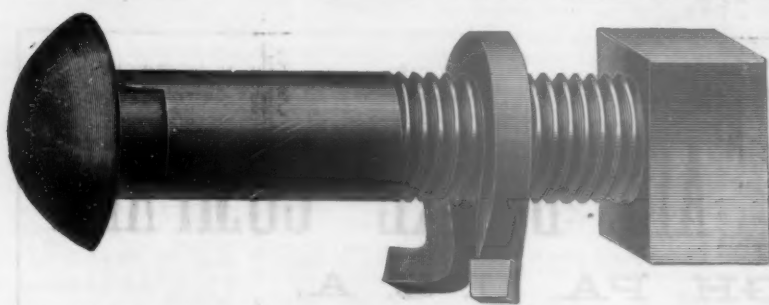
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Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers furnished to operate with either STEAM AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the
STANDARD NUT LOCK CO.,
 NOS. 236-248 BANK ST., NEWARK, N. J.
 SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously: rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down thread of bolt.

The nut lock for $\frac{3}{4}$ inch bolt made of $\frac{1}{4}$ inch square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e., the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in inwardly curved extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard is interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position it offers double the locking friction of nut locks, which when in their dead "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

THE STANDARD COMBINATION TIE PLATE AND BRACE

POSSESSES THE FOLLOWING MERITS:

1. It prevents absolutely the canting of the rail into the tie, thereby greatly increasing the life of the tie.
 2. It prevents the rails from spreading or canting over and wearing one side only.
 3. The combination of the brace and plate obviates the necessity of spiking the rail and brace separately, thereby saving two spikes and securing the service of the inside spike for holding the rail; it also prevents the rail from working up and down, and laterally, thus making it impossible to wear the neck of the spike.
 4. The plate and brace being made of malleable iron, is practically indestructible.
- The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

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WILLIAM H. PHILLIPS.

Simple.

Easily

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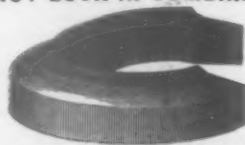
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THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

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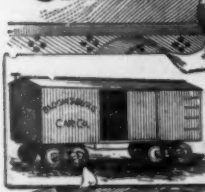
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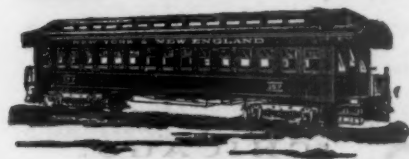
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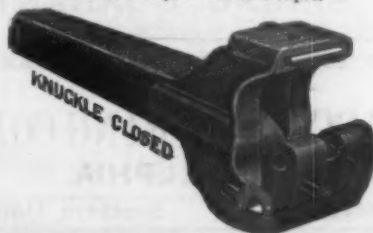
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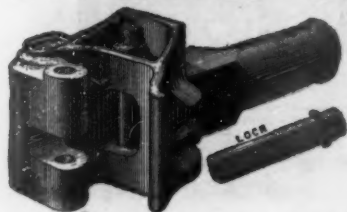
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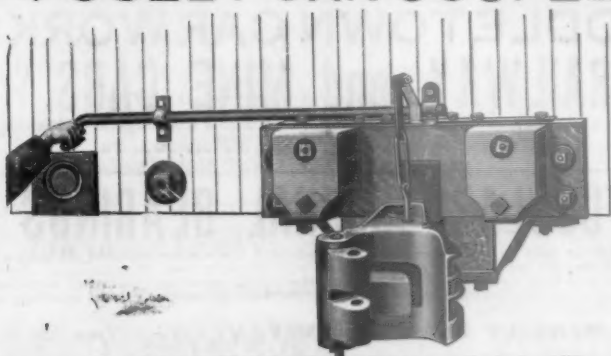
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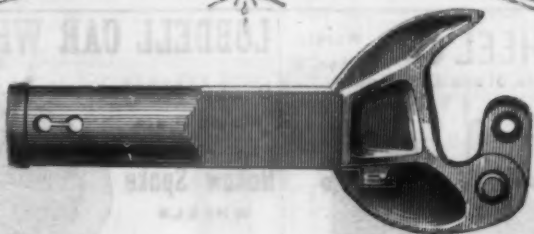
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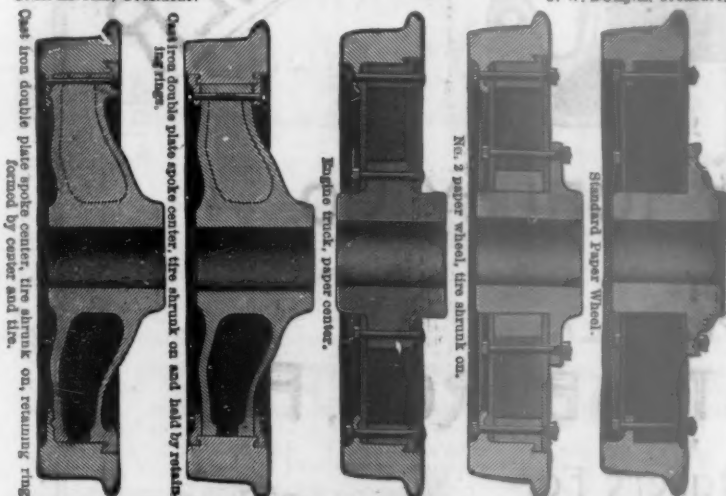
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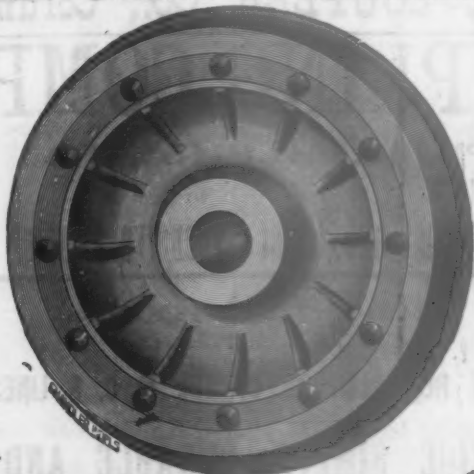
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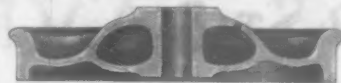
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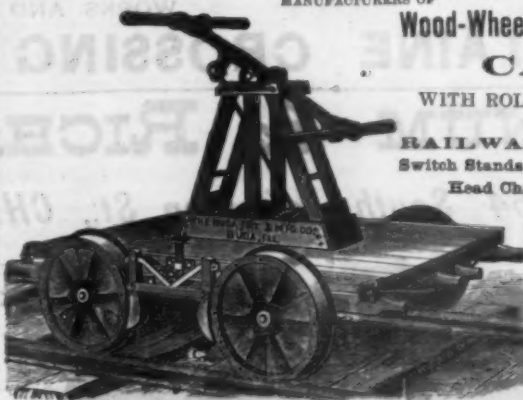
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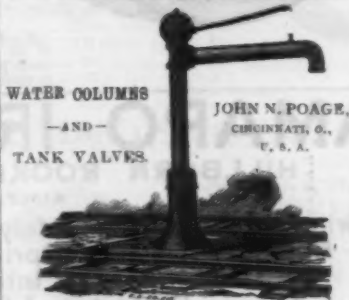
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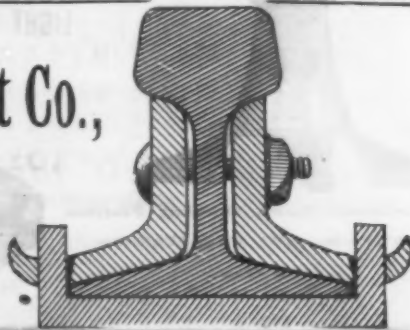
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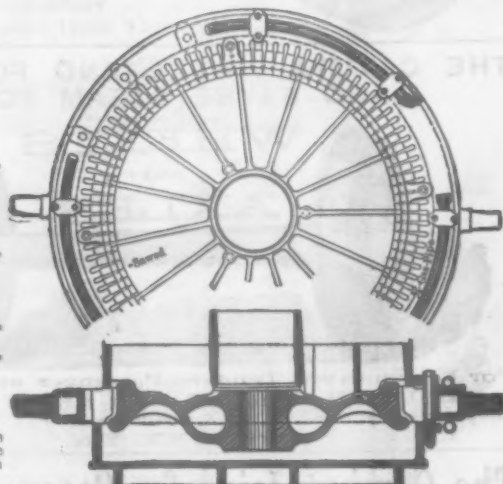
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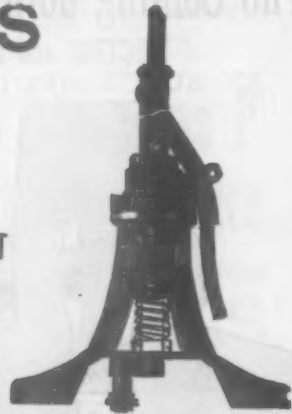
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 of Parts while being thrown
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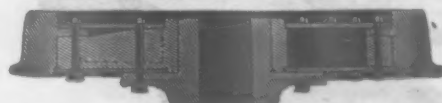
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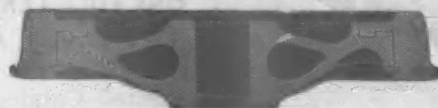
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NOTE.—On Sunday the White Train arrives
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The equipment of above trains will consist
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FARE \$6.00,
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Tickets will not be sold beyond the seating
capacity of the train.

A. S. HANSON,
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SUNDAY SERVICE.

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A. M., Sunday, arriving at Lake Villa 10:30 A. M.,
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tables and pamphlets apply to **GEO. K. THOMPSON**, City Passenger & Ticket Agent,
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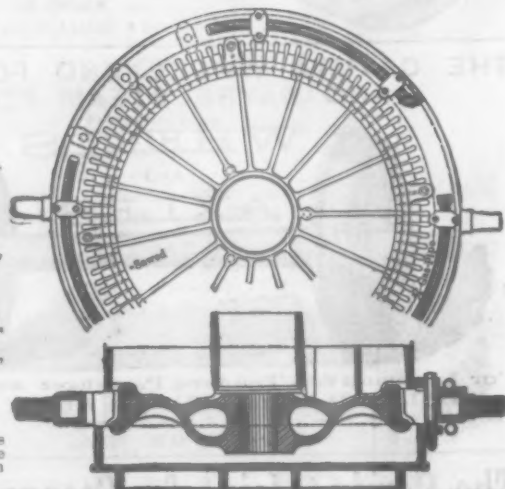
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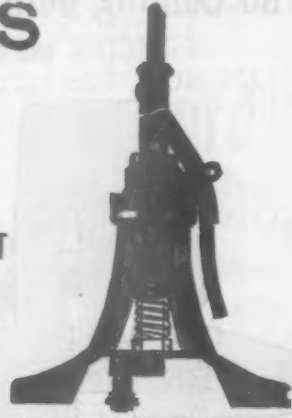
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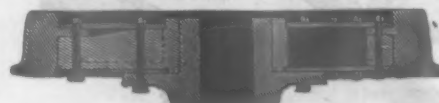
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FOR
 CHILLED IRON
 CAR WHEELS
 MADE BY
RAMAPO WHEEL & FOUNDRY CO.

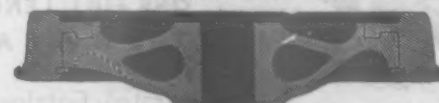
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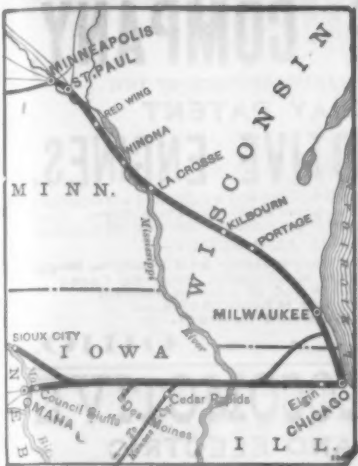
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TICKET OFFICES:
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POINTS WEST,
NORTHWEST,
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12 00 NOON, DUE 5:40 P. M.

—ONLY—
5 Hours and 40 Minutes.

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A. S. HANSON,
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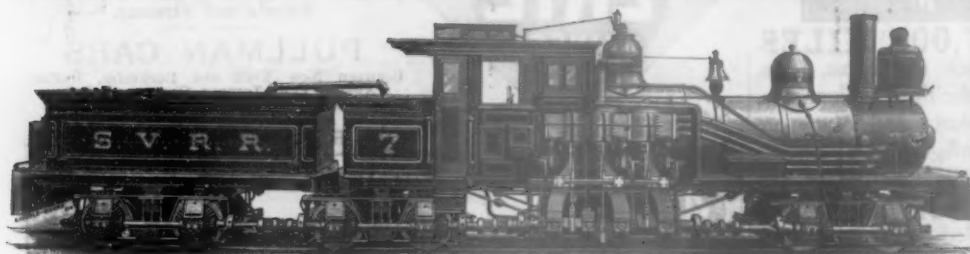
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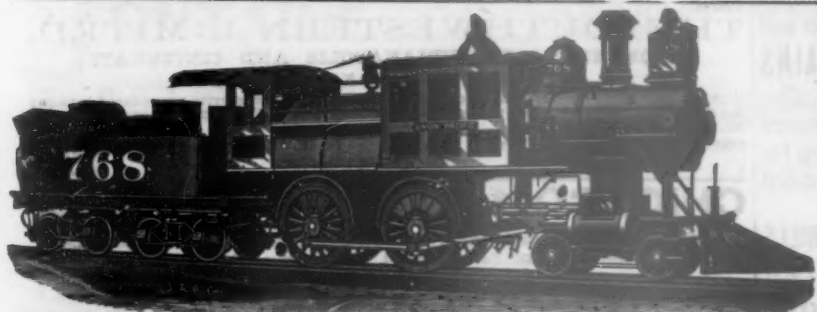
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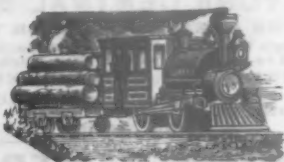
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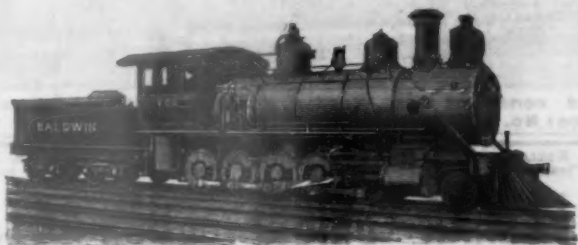
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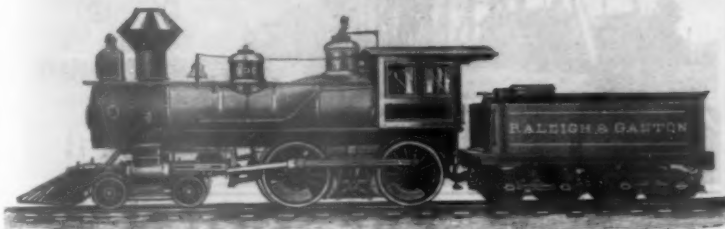
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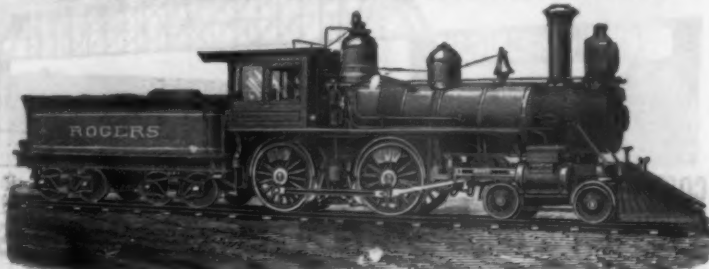
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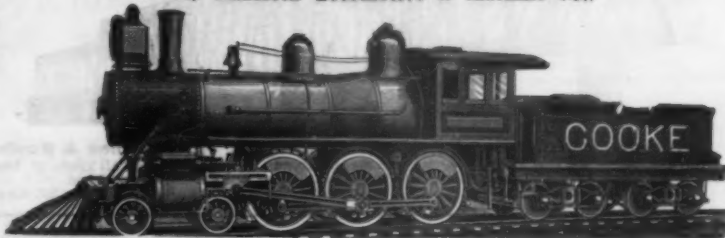
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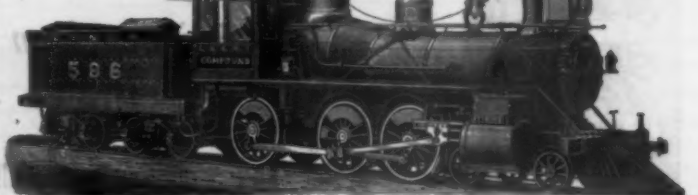
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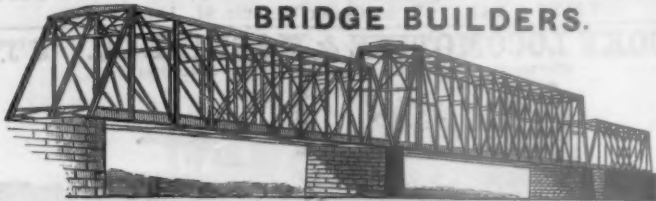
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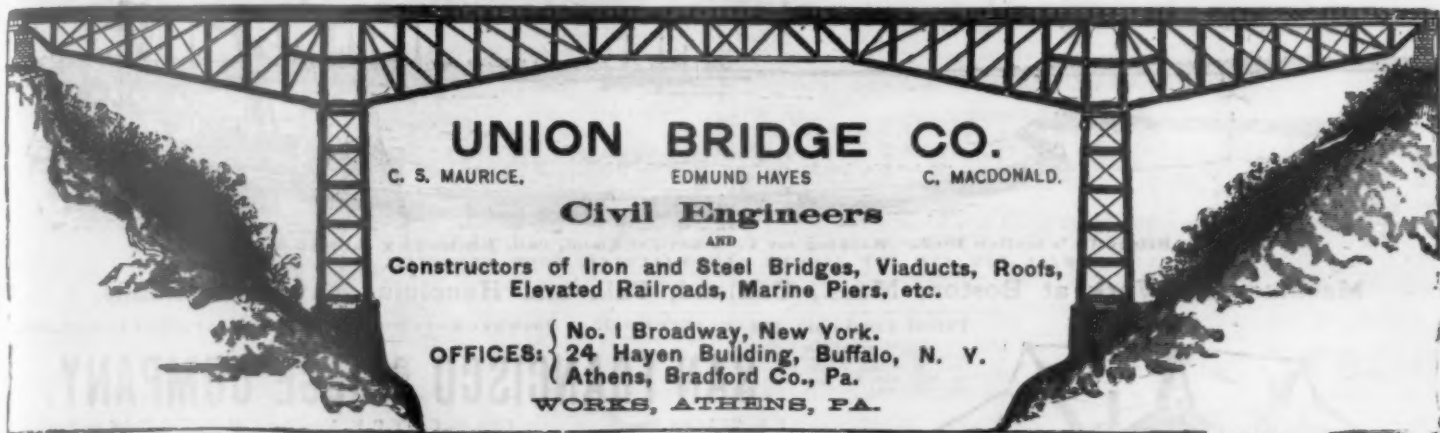
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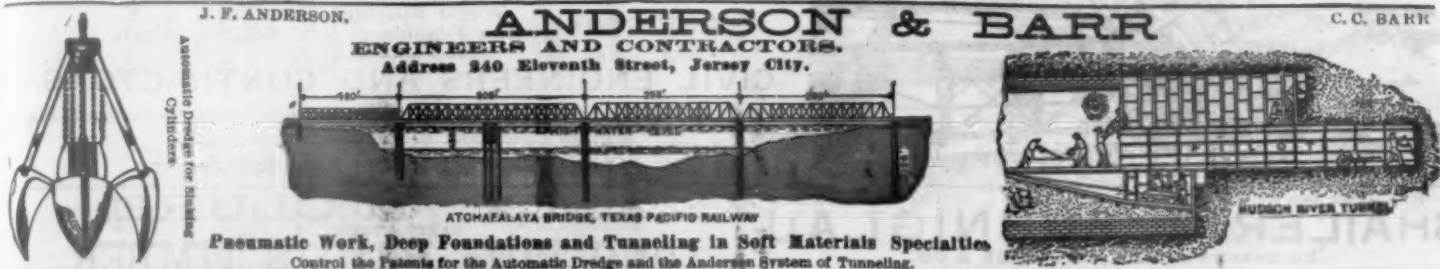
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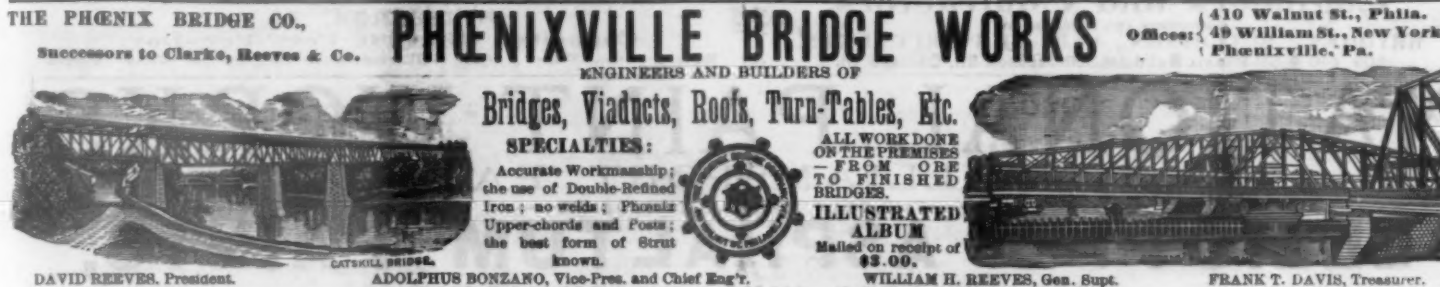
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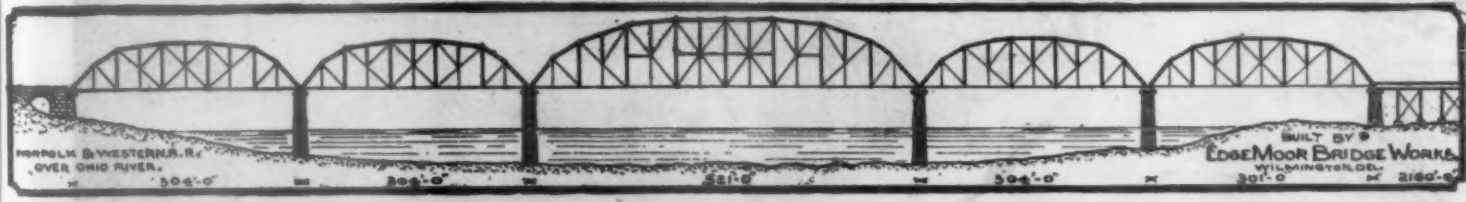


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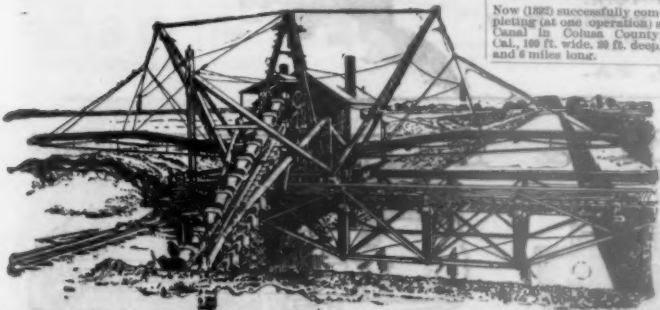
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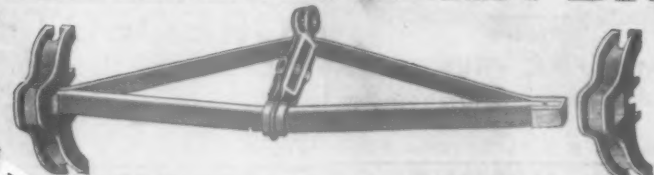
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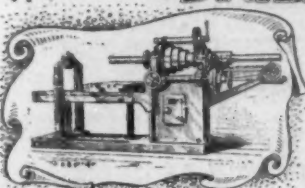
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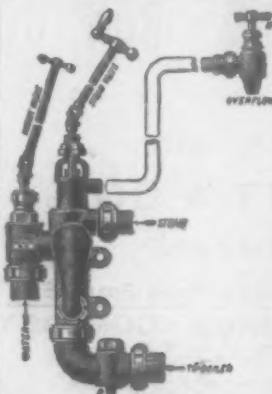


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